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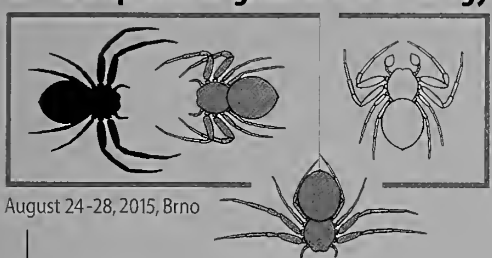

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Preface to the Proceedings of the 29th European Congress of Arachnology, Brno, 2015 August 24-28

At the 28th European Congress in Torino I was approached by the society president, Wolfgang Nentwig, with the question whether I could organise the next congress because the society had not received an invitation for 2015. I was surprised and astonished at the same time by his request and had to think for a couple of days about it. I have to admit that I was planning to organise a congress in a near future. But 2015 was very near – only 11 months to go. After checking out the possibilities I decided to make it.

Before this congress there have been two international arachnology meetings organised in the Czech Republic over an approximately 20-year period. In 1971 there was the 5th International Congress of Arachnology in Brno; and in 1994 there was the 15th European Colloquium of Arachnology in České Budějovice.

I assembled a team composed of three co-organisers (Vladimír Hula, Jana Niedobová, Yuri Marusik), two secretaries (Ivana Tarabová and Hana Bezděková from the TA-Service), the photographer (Radek Šich), English editor (L. Brian Patrick), editor of publications (Šárka Mašová) and a number of helpers (Guadalupe Corcobado, Lucie Havlová, Ondřej Košulič, Eva Líznarová, Radek Michalko, Ondřej Michálek, Lenka Sentenská, Zdeněk Škopek). A couple of other members of the Czech Arachnological Society gave a helpful hand (Petr Dolejš, Martin Forman, Pavel Just, Tomáš Krejčí, Ondřej Macháč).

The 29th European Congress of Arachnology was jointly organised by the Masaryk University, Czech Arachnological Society and Mendel University. It began on Saturday morning with an intensive two-day workshop on IUCN Red Listing – concepts and tools, led by Pedro Cardoso. There were about 10 participants from all over the world. The other workshop announced, Experimental design and modern data analysis, was cancelled due to insufficient interest. Most of the participants, however, turned up on Sunday afternoon. They were greeted by a young blond (cardboard) lady, who became a regular participant over the week.

During the Opening Ceremony the honorary committee member, Jan Buchar, gave a short commemorative speech on the congress from 1971; sadly 3 months later Jan passed away (see the obituary in this volume). Then Vlastimil Růžička reminded us the atmosphere of the České Budějovice colloquium. And finally, Peter Dvořák, the vice-rector of Masaryk University, spoke about the university.

Brno is the city of Johann Gregor Mendel, the father of a modern genetics. In 2015 we were commemorating 150 years since he gave a lecture about the results of breeding experiments at the meeting of the Natural History Society in Brno. And therefore the main emphasis of the congress was on Mendel's legacy: the first plenary lecture was on developmental genetics (by Wim Damen), there was a major session on arachnid cytogenetics, the Opening Party was at the Mendel museum and the logo of the congress was inspired by Mendel's discovery of the genotypic ratio (1:2:1) for heterozygotes in the F1 generation (the three different colours, while the different spider postures represented ecology, behaviour, physiology and taxonomy).

29th European Congress of Arachnology

August 24-28, 2015, Brno

The congress was attended by 169 participants and accompanying persons from 36 countries across the globe, with a dominance of local (Czech) arachnologists (23 %), followed by Germans and Slovenians. The programme had a traditional structure: scientific sessions were held over four days, followed by a social programme in the evening. One exception was the Arachnological Games (we played the Kubb in teams) followed by a barbeque at the Starobrno restaurant. In comparison with the previous congresses the ESA assembly was held on Thursday. The main task of the assembly was to approve new by-laws of the society.

The scientific programme included 13 sessions. Although there was a proposal for two symposia prior to the congress – one for 'Ecosystem services and adaptation' and 'Diversification of spider silks: how and why do new silk phenotypes evolve?' – none was eventually organised (due to low interest in the topics). The largest sessions were on Behavioural ecology, Ecology and Cytogenetics of arachnids. Altogether there were 61 oral communications and 75 posters. The sessions were arranged to avoid parallel sessions. Beside sessions, there were four plenary talks, at the beginning of each of four days of talks. Wim Damen from the Jena University in Germany, opened the congress with his talk on how genes control segmentation during ontogenetic development in a theridiid spider. Gabriele Uhl from the University of Greifswald in Germany spoke about various facets of mating behaviour in the cannibalistic spider, *Argiope bruennichi*. Jordi Moya-Laraño from the Experimental Station of Arid Zones in Spain presented a simulation program on eco-evolutionary dynamics in complex food webs. Finally, on the very last day Jonathan Pruitt from the University of Pittsburgh in the US, presented results on the personality of spiders.

On Wednesday there were the mid-congress excursions. Participants could choose to take one of three trips. Luckily, the weather was nice. One was a collecting trip in the Pavlovské vrchy Hills protected area and nearby areas which are located south of Brno. Participants could see some rare arthropods, including spiders on dry grasslands. At the end of the trip they visited Křivé jezero Nature Reserve, a water meadow between two rivers. The largest group of participants took the cornucopia trip that included bits of everything: spider collection, sight-seeing and wine tasting. They went to Mikulov town which is located at the foot of Pavlovské vrchy. In the

1 Konrad Wiśniewski, 2 Henning Haase, 3 Arthur Decae, 4 Isván Prazsak, 5 Davide Ruiu, 6 Luiz Filipe Bartoleti, 7 Paula Cushing, 8 Nik Lupše, 9 Artem Sozontov, 10 Inese Cera, 11 Seppo Koponen, 12 Marjan Komnenov, 13 Heli Hurme, 14 Ondřej Machač, 15 Robert Tropek, 16 Hana Svojanovská, 17 Matjaž Gregorič, 18 Shakira Quiñones-Lebrón, 19 Lenka Kubcová, 20 Miguel Richard, 21 Věra Opatová, 22 Fabian Hofmann, 23 Ren-Chung Cheng, 24 Matjaž Kuntner, 25 Gabriele Uhl, 26 Stanislav Korenko, 27 Wolfgang Nentwig, 28 Zdeněk Škopek, 29 Ravid Steinpress, 30 Rahsen Kaya, 31 Igor Armiach, 32 Ersen Yağmur, 33 Ondřej Michálek, 34 Ulla Thyssen, 35 Søren Toft, 36 Francesco Ballarin, 37 Lenka Sentenská, 38 Liana Lasut, 39 Igor Gajić, 40 Marco Isaia, 41 John Haymoz, 42 Lucia Kuhn-Nentwig, 43 Holger Frick, 44 Christoph Hörweg, 45 Daniel Gloor, 46 Lenka Petráková, 47 Łukasz Trębicki, 48 Augustine Niba, 49 Jiří Král, 50 L. Brian Patrick, 51 Wim Damen, 52 Christo Deltshev, 53 Christian Kropf, 54 Tamás Szüts, 55 Mariia Fedoriak, 56 Elisabeth Bauchhenß, 57 Peter Jäger, 58 Anne-Sarah Ganske, 59 Andrej Tanasevitch, 60 Shou-Wang Lin, 61 Rimma Seyfulina, 62 Tomas Nowicki, 63 Nina Polchaninova, 64 Christoph Muster, 65 Vardit Makover, 66 Gordana Grbić, 67 Maciej Bartos, 68 Nollie Hallensleben, 69 Gábor Kovács, 70 Roland Horváth, 71 František Šťáhlavský, 72 Peter Gajdoš, 73 Anna Šestáková, 74 Pavel Žila, 75 Katrin Kunz, 76 Anja Junghanns, 77 Guilherme Gainett, 78 Pedro Cardoso, 79 Jordi Moya-Laraño, 80 Theo Blick, 81 Marek Žabka, 82 Madeleine Miller, 83 Jan Dolanský, 84 Tjaša Lokovšek, 85 Vlastimil Růžička, 86 Jan Raška, 87 Petr Dolejš, 88 Milan Řezáč, 89 Thiago Kloss, 90 Marlis Dumke, 91 Eva Líznarová, 92 Jan Erhart, 93 Vladimír Hula, 94 Jens Runge, 95 Sara Normark, 96 Matyáš Hiřman, 97 Janet Beccaloni, 98 Pavel Just, 99 Jonathan Pruitt, 100 Lior Ventura, 101 Alba Cherubini, 102 Alessio Trotta, 103 Luka Katušić, 104 Martina Pavlek, 105 Elena Piano, 106 Stefano Mammola, 107 Philip Steinhoff, 108 Jana Niedobová, 109 Jana Frisová-Christophoryová, 110 Katarina Krajčovičová, 111 Jesús Hernández Corral, 112 Jana Kotrbová, 113 Jana Plíšková, 114 Orsolya Beleznai, 115 Csaba Szinetár, 116 Hirotsugu Ono, 117 Yael Lubin, 118 Karin Sindemark Kronestedt, 119 Torbjörn Kronestedt, 120 Eytan Avital, 121 Robert Bosmans, 122 Marij Decleer, 123 Rudy Jocqué, 124 André Walter, 125 Blerina Vrenozi, 126 Jagoba Malumbres-Olarte, 127 Azucena Claudia Reyes, 128 Sara Goodacre, 129 Rebecca Wilson, 130 Cor Vink, 131 Peter van Helsdingen, 132 Peter Kozel, 133 Paul Selden, 134 Maura Selden, 135 Lucie Havlová, 136 Marielle van Dam, 137 Marnix Bos, 138 Jutta Schneider, 139 Simona Kralj-Fišer, 140 Efrat Gavish-Regev, 141 Christian Komposch, 142 Stano Pekár (photo: R. Šich)

Jan Buchar, the honorary committee member

morning they walked up the hill, a protected area and could see some Pannonian spider species. Then they took a short walk through the historical centre of the town, visited a wine-producing company where they learned about the wine biological production process and tasted wine. The smallest group of attendees explored the Lednice-Valtice Cultural Landscape, a UNESCO World Heritage Site; a large landscape area famous for the masterful integration of various architectonical structures, chateaux and French-style gardens. The participants walked up the stairs (to heaven) of a Minaret, took a boat trip and saw beavers' constructions, to reach a romantic castle ruin, the John's Castle. In the evening we returned to Brno for the big social event, the Russian party. There was lots of fine caviar and fish provided by Yuri Marusik, home-made whiskeys from all corners of Europe and music provided by a DJ.

A couple of participants went for the post-congress excursion to the Podyjí (Thaya) National Park situated along the deep Dyje River valley. We visited the underground city of Znojmo, tasted wine in the old monastery cellars of Znovín winery, took a boat trip to the early medieval Bítov Castle where we practiced archery and explored stuffed dogs.

During the Closing Ceremony awards were presented. There were 64 student presentations registered for the competition. I wish to congratulate again the students that received an award for their oral presentation or a poster. Altogether 12 students were awarded, six for oral presentations and six for posters. The awards were given in two categories. In Ecology and Behaviour the best oral presentations were: 1. Lenka Sentenská (Czech Republic), 2. Eva Líznarová (Czech Republic), 3. Andreas Fischer (Germany). The best posters were: 1. Thiago Kloss (Brasil), 2. Marlis Dumke (Germany), 3. Elena Piano (Italy). In Taxonomy and Genetics (which actually covered also other topics not mentioned in the title) the best oral presentations were: 1. Stefano Mammola (Italy), 2. Luka Katušić (Croatia), 3. Liana Lasut (Switzerland). The best posters were: 1. Guilherme Gainett (Brasil), 2. Nik Lupše (Slovenia), 3. Matyáš Hiřman (Czech Republic). The evaluating committees had to work hard throughout the whole week.

Beside the student awards, the Arachnological cup was given for non-scientific activities at the ceremony. The winner of the Arachnid Film competition, Lukáš Pich, was awarded for his film named "Wolf Spider: The mother". The best team of the Kubb, called THUG Greifswald (composed of Jens Runge, Katrin Kunz, Guilherme Gainett, Tomas Nowicki, Shou-Wang Lin) won a cup too.

I should not forget to mention the sponsors of this congress. Without the generous financial help of Becherovka, Dynex, Ento Sphinx, Keyence International, Masaryk University, Mendel Museum, Nikon, Olympus, Regina Coeli, Réva Rakvice and Zeiss, the congress fee would have been much higher. Particular thanks goes to the European Society of Arachnology, American Arachnological Society, Grupo Ibérico de Aracnología, British Arachnological Society, Arachnologische Gesellschaft, Czech Arachnological Society and Siri Scientific Press for providing prizes for the student competition. Thanks to the support by European Society of Arachnology, Pensoft, Grupo Ibérico de Aracnología and Czech Arachnological Society, we were able to provide 18 student grants and to support six colleagues from low-income countries.

This Proceedings includes five contributions, two will follow in vol. 52, nine manuscripts were submitted.

At last but not least I would like to thank all participants for attending the congress and making it an unforgettable event (at least for me).

Stano PEKÁR

Storage buildings and greenhouses as stepping stones for non-native potentially invasive spiders (Araneae) – a baseline study in Basel, Switzerland

Ambros Hänggi & Sandrine Straub

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Abstract. Transportation of goods via land, sea or air causes a dissemination of species on a global scale. In central Europe species that are associated with fruit, vegetables and/or buildings are suspected to be imported and potentially build up populations in the following four categories of buildings: I) greenhouses, garden centres, flower shops and flower wholesale stores, II) storage buildings and logistic centres, III) botanical gardens and zoos and IV) touristic hotspots. During this research 20 such localities in and around Basel were investigated by means of visual searching. 340 adult spider individuals were collected, representing 37 species and 15 families. Three were first records for Switzerland. Eight species were not published before for the region of Basel even if six of these were already known in private, not published collections – partly going back to the 1930s. Our investigation shows that the interpretation of the spread and invasion of species needs good published knowledge about the actual status of our fauna which, especially for synanthropic spiders, is not the case. We therefore urge everybody to publish all knowledge about faunistics even for so-called common species.

Keywords: faunistics, species introduction, new records

Zusammenfassung. Lagerhäuser und Gewächshäuser als Trittsteine für potenziell invasive nicht-einheimische Spinnen (Araneae) – eine Bestandsaufnahme in Basel, Schweiz. Gütertransport auf dem See-, Land- oder Luftweg verursacht die Verschleppung von Arten in einem globalen Rahmen. In Mitteleuropa können vor allem Arten, welche mit Früchten, Gemüse und/oder Gebäuden assoziiert sind, importiert werden und eventuell in den folgenden vier Kategorien von Gebäuden dauerhafte Populationen ausbilden: I) Gewächshäuser, Gartencenter und Blumenhandelsketten, II) Lagerhäuser und Logistikhäuser, III) Warmhäuser in Zoos und botanischen Gärten und IV) touristische Knotenpunkte. An 20 solchen Orten in und um Basel wurden Spinnen mit Sichtfang gesammelt. 340 adulte Spinnen verteilt auf 37 Arten aus 15 Familien wurden gefangen. Drei Arten waren Erstnachweise für die Schweiz. Acht Arten wurden erstmals für die Region Basel gemeldet, wobei sechs davon schon aus Privatsammlungen bekannt, aber nicht publiziert waren - teilweise bereits aus den Dreissigerjahren des letzten Jahrhunderts. Unsere Untersuchung zeigt, dass für die Interpretation von Invasion oder Ausbreitung von Arten gute faunistische Kenntnisse unabdingbar wären, die aber speziell für synanthrope Arten fehlen. Wir empfehlen daher dringend alle faunistischen Daten, auch zu sogenannten trivialen Arten zu publizieren.

The collection of the Natural History Museum of Basel (NMB) houses many alien spiders that originate from transport of vegetables and especially of fruit. Not only the well-known „Banana spider" *Heteropoda venatoria* (Linnaeus, 1767), but a further 13 alien spider species are documented in the NMB. Most of these spiders were found in the last century in cold storage houses and at least some of them were already dead upon arrival. Other sources for alien spiders are botanical gardens. Already Holzapfel (1932) recorded *Mermessus maculatus* (Banks, 1892) (sub *Eperigone m.*) and *Hasarius adansoni* (Audouin, 1826) from the Botanical garden in Bern. A similar investigation has been done in, e.g., the Humid Tropic Biome at the Eden Project in Cornwall (UK) by Smithers et al. (2004), where six alien species of spiders have been found. One reason for finding alien species in botanical gardens is certainly the exchange of plants including potting soil between the gardens. For Switzerland Hänggi (2003) discussed further records of alien spider species in Swiss hothouses or similar buildings.

International trade is increasing more and more. Transportation of goods on a global scale is a daily business. All this supports the transport of alien species around the world (Kobelt & Nentwig 2008, Nentwig 2015). In the database DAISIE (www.europe-aliens.org) lots of alien spider species are documented for every European country (Nentwig & Kobelt 2010, Roy et al. 2011). As an example, in the last five years the "Arachnologische Mitteilungen" published 10 papers dealing with alien spiders, many in warm houses or among fruit in food stores. Some of these are rather singular findings (Jäger 2009, Kielhorn & Rödel 2011) others seem to have established durable populations (Jäger 1998, Vanuytven 2004).

But what do we really know about the mechanism of the entering or what impacts these new species have in the new environment? Hänggi & Zürcher (2013) showed that the spreading of the southern spider *Zoropsis spinimana* (Dufour, 1820) occurred very fast. Only about 20 years after the first record north of the Alps the species spread everywhere in the surroundings of Basel and today is present in nearly all cities of Switzerland. Even if this species is not an alien species in the strict sense as defined in Nentwig (2015), it is obviously a non-native species for Europe north of the Alps. It indicates that at least some non-native species may spread with human activity (being introduced), are able to build up new populations (establish) and then potentially have an impact on other species (becoming invasive). While we do not know what the impact of these 'new' species really is, we should at least know which species are here.

One of the most problematic points in this context is data deficiency. We always depend on what is published, but is this published dataset the reality? Certainly not, as may be shown with the example of the spider *Brigittea* (= *Dictyna*) *civica*. Everybody working with spiders in Central Europe knows very well that this species occurs in very high numbers in every city in southern Central Europe since the middle of the last century. But Maurer & Hänggi (1990) cited only four records for Switzerland: one from Tessin, two from Lake Geneva and one from Wallis; and none from Basel where Schenkel collected the species at least in 1937, 1947 and 1950 (collection NMB). In the past 10 years, there were several investigations on spiders in Basel (Brenneisen & Hänggi 2006, Gloor et al. 2008, Altherr 2007) but none of these recorded *B. civica*. A similar situation can be found in Germany (Wiehle 1953, Staudt 2015).

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All these aspects show that there is a need for more published data, especially for so-called trivial species. Only if we know what is here, or was here at a defined time, will it be possible to make any interpretations about the potential spreading of non-native species. The aim of this paper is to present the dataset of a collection in Basel, Switzerland. Twenty localities in and around Basel with a high potential of housing alien spiders were examined. The data include three first records for Switzerland and seven species not yet published for the surroundings of Basel.

Methods

20 localities in and around Basel were investigated (Tab. 1). All these localities have a high potential for non-native spider species. They are categorised in four groups:

I) Greenhouses, Garden centres, flower shops and flower wholesale stores

It was supposed that greenhouses of nurseries would be the most important locality type. First, the high trade frequency supports the entry of alien spiders with flowers and potted plants. Then again, there is a high probability for the spiders to survive due to the consistent warm climate. We investigated six greenhouses, three flower shops, one garden centre and two flower wholesale stores.

II) Storage buildings and logistic centres

In this category the harbour buildings of Basel are included. The other two logistic centres are mainly specialized in flower and food logistics. One of them, Galliker Transporte, organises all fruit and vegetable imports for one of the biggest food sellers in Switzerland.

III) Botanical gardens and zoos

Botanical gardens, especially the hothouses, are of special interest. Here even species adapted to a tropical climate are able to survive. To know which species are living there is certainly important, even if it is not to be expected that these species will spread out of the hothouses. In the zoos alien species may be imported by plants and/or by special food supplies for the animals. Three such special habitats were investigated.

IV) Touristic hotspots

Jäger (1995, 2011) and Brenneisen & Hänggi (2006) published records of non-native spider species at train stations or along highways (Hänggi & Bolzern 2006). It is suggested that not only carriage of freight is a possible pathway of species, but it is also possible that spiders may come in with the luggage of tourists. Two such places were investigated. Unfortunately it was not possible to investigate the freight storage rooms at the airport due to administrative problems.

At every site spiders were collected by hand, without using traps. The length of time for collecting

Tab. 1: Investigated localities in and around Basel, Switzerland

Group	Loc Nr.	Locality Name	Address	Zip Code City	Coordinates (WGS84)	Altitude (m)	Notes
I	1	Flowershop Au Bouquet	Elisabethenstrasse 15	4051 Basel	N 47° 33' 10.65" E 7° 35' 30.52"	269	one room
I	2	Flowershop Denzeisen	St.Johanns-Vorstadt 60	4056 Basel	N 47° 33' 52.71" E 7° 35' 1.41"	249	one room
I	3	Flowershop Rheinblumen	Blumenrain 232	4051 Basel	N 47° 33' 40.23" E 7° 34' 22.49"	257	one room
I	4	Nursery Bürgerspital	Friedrich Miescher-Strasse 30	4012 Basel	N 47° 34' 20.88" E 7° 33' 41.88"	266	several rooms
I	5	Nursery Dobler	Lanjurtenstrasse 10	4132 Muttenz	N 47° 30' 43.46" E 7° 39' 30.62"	347	several rooms
I	6	Nursery LBB	Nonnenweg 68	4012 Basel	N 47° 33' 34.68" E 7° 34' 33.1"	271	several rooms
I	7	Nursery Meyer & Söhne	Allmendstrasse 160	4058 Basel	N 47° 33' 47.75" E 7° 37' 22.37"	261	several rooms
I	8	Nursery Peter Merian	Vorder Brüglingen 5	4052 Basel	N 47° 32' 17.34" E 7° 36' 50.31"	268	several rooms
I	9	Garden Center OBI	Reinacherstrasse 29	4053 Basel	N 47° 32' 26.53" E 7° 36' 12.61"	281	one spot
I	10	Flower wholesale Fleurametz	Reinacherstrasse 117	4053 Basel	N 47° 32' 13.44" E 7° 36' 16.59"	283	one room
I	11	Flower wholesale Regioflora AG	Schorenweg 10	4144 Arlesheim	N 47° 30' 20.21" E 7° 36' 45.67"	274	one room
I	12	Nursery City Basel	Unter Brüglingen 3a	4142 Münchenstein	N 47° 32' 3.93" E 7° 36' 54.23"	261	several rooms
II	13	Harbour Kleinhünnigen	Westquaistrasse	4057 Basel	N 47° 34' 59.39" E 7° 35' 15.09"	248	one building
II	14	Galliker Transportation	Bäumlimattstrasse 7	4313 Möhlin	N 47° 34' 32.29" E 7° 51' 15.76"	294	one building
II	15	M&R Spedag	Kriegsackerstrasse 91	4132 Muttenz	N 47° 32' 5.69" E 7° 38' 5.81"	280	one room
III	16	Botanic Garden Basel	Schönbeinstrasse 6	4056 Basel	N 47° 33' 30.9" E 7° 34' 54.47"	269	several buildings
III	17	Zoo of Basel	Binningerstrasse 40	4011 Basel	N 47° 32' 51.41" E 7° 34' 46.09"	270	several buildings
III	18	Zoo Lange Erle	Hirzbrunnen	4058 Basel	N 47° 34' 27.59" E 7° 36' 30.5"	253	several buildings
IV	19	Railwaystation Basel SBB	Centralbahnhofstrasse 18	4051 Basel	N 47° 32' 48.36" E 7° 35' 20.94"	276	several rooms
IV	20	Railwaystation Badischer Bahnhof	Schwarzwaldstrasse 161	4059 Basel	N 47° 34' 5.33" E 7° 36' 23.11"	256	incl. data of student excursion (M. Monzel)

was not fixed and depended on the size of the building, but the minimum collecting time was two hours. Special emphasis was given to light sources, window frames, overhanging sills and undisturbed niches. All sites were visited between 19.12.2013 and 6.5.2014. Further data for the locality Badischer Bahnhof originate from a student excursion on 19.6.2013 guided by Markus Monzel, Biogeography, Dept. of Environmental Sciences, University of Basel. Not all detected spiders were caught when there were high numbers of individuals, but attempts were made to get all the different species. Therefore numbers of specimens are not strictly comparable between sites. Collected spiders were put in 75 % ethanol and determined in the laboratory.

For the determination the internet key "Araneae – spiders of Europe" (Nentwig et al. 2015) and a lot of specific literature was used. Only adult specimens were determined to species level. Nomenclature follows the World Spider Catalog (2015). Voucher specimens of every species are deposited in the collection of the Natural History Museum Basel.

Results

340 adult individuals (62 ♂♂, 278 ♀♀) were collected representing 37 species out of 15 families (Tab. 2). Theridiidae with eight species was the most frequent family, followed by Pholcidae and Salticidae with five species each and Agelenidae with four species. 15 species are not at all typically synanthropic spiders and were caught only as one or two individuals and always only at one site (marked with * in Tab. 2).

Even if collecting was not strictly standardised some differences in abundance and frequency are obvious. The most frequent species were *Pholcus phalangioides* (13 sites), *Parasteatoda tepidariorum* (12), *Steatoda triangulosa* (12), *Holocne-*

Tab. 2: Species list with ♂♂/♀♀ per locality. * in ns means: non synantropic species. Locality groups: I) greenhouses, garden centres, flower shops and flower wholesale stores; II) storage buildings and logistic centres; III) touristic hotspots; IV) botanical gardens and zoos

Species	ns	Locality																				Total
		Group I												II			III			IV		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Agelenidae																						
Eratigena atrica (C.L.Koch, 1843)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0/1	.	.	.	0/1
Tegenaria domestica (Clerck, 1757)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0/2	.	.	.	0/2
Tegenaria ferruginea (Panzer, 1804)	*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0/1	.	.	0/1
Tegenaria hasperi Chyzer, 1897	*	.	.	.	.	0/1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0/1
Amaurobiidae																						
Amaurobius ferox (Walckenaer, 1830)	.	.	.	.	.	1/0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1/0
Araneidea																						
Larinioides sericatus (Clerck, 1757)	.	.	.	.	.	.	.	.	0/3	.	.	.	.	0/1	.	.	.	.	.	.	0/2	0/6
Zygiella x-notata (Clerck, 1757)	*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0/2	.	.	.	0/2
Phrurolithidae																						
Phrurolithus festivus (C.L.Koch, 1835)	*	.	.	.	.	1/0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1/0
Dictynidae																						
Brigittea civica (Lucas, 1850)	.	.	.	.	.	.	.	.	.	.	1/2	.	.	0/1	.	.	.	.	.	.	0/1	1/4
Lathys humilis (Blackwall, 1855)	*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1/0	.	.	1/0
Gnaphosidae																						
Haplodrassus silvestris (Blackwall, 1833)	*	.	.	.	.	1/0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1/0
Trachyzelotes pedestris (C.L.Koch, 1837)	*	.	.	.	.	1/0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1/0
Linyphidae																						
Agyneta rurestris (C.L.Koch, 1836)	*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0/1	.	.	.	.	0/1
Tenuiphantes tenuis (Blackwall, 1852)	*	.	.	.	.	.	.	.	1/1	.	.	.	.	.	.	.	.	.	.	.	.	1/1
Lycosidae																						
Pardosa hortensis (Thorell, 1872)	*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2/0	.	.	.	.	2/0
Miturgidae																						
Cheiracanthium mildei L.Koch, 1864	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0/1	.	.	0/1
Oecobiidae																						
Oecobius navus Blackwall, 1859	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3/4	.	.	0/1	3/5

Species	ns	Locality																				Total
		Group I												II			III			IV		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Pholcidae																						
Holocnemus pluchei (Scopoli, 1763)	.	.	.	.	1/5	0/1	.	.	.	.	1/2	1/3	.	2/2	4/0	1/3	.	.	.	1/0	0/3	11/19
Pholcus opilionoides (Schrank, 1781)	.	.	.	.	.	.	.	.	0/1	.	.	.	.	.	.	.	.	.	.	.	.	0/1
Pholcus phalangioides (Fuesslin, 1775)	.	.	.	0/1	3/5	.	0/3	.	0/1	.	.	0/1	.	0/1	2/2	1/0	3/4	6/21	0/7	1/4	1/1	17/51
Psilochorus simoni (Berland, 1911)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0/1	0/1	.	.	.	0/2
Spermophora senoculata (Dugès, 1836)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0/1	.	.	.	0/1
Salticidae																						
Ballus chalybeius (Walckenaer, 1802)	*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1/0	1/0
Hasarius adansoni (Audouin, 1826)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1/1	.	.	.	1/1
Heliophanus kochii Simon, 1868	*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1/0	1/0
Pseudeuophrys lanigera (Simon, 1871)	.	.	.	.	.	2/2	.	0/3	1/0	.	.	.	.	.	.	.	.	.	.	.	.	3/5
Salticus scenicus (Clerck, 1757)	.	.	.	.	.	.	.	.	1/0	.	.	.	.	.	.	.	.	.	.	.	.	1/0
Tetragnathidae																						
Metellina mengei (Blackwall, 1869)	*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0/1	.	.	.	0/1
Theridiidae																						
Coleosoma floridanum Banks, 1900	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0/1	.	.	.	.	0/1
Cryptachaea blattea (Urquhart, 1886)	.	.	.	.	2/0	.	0/1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2/1
Episinus truncatus Latreille, 1809	*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2/0	2/0
Parasteatoda tepidariorum (C.L.Koch, 1841)	.	.	.	0/1	0/1	2/11	0/1	0/1	0/1	.	.	1/0	.	.	.	1/0	.	1/7	0/4	0/1	1/4	6/32
Steatoda bipunctata (Linnaeus, 1758)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0/4	0/1	.	.	0/5
Steatoda triangulosa (Walckenaer, 1802)	.	.	0/1	.	0/2	.	.	0/4	0/3	.	.	1/0	0/1	.	.	0/1	0/1	0/7	0/3	0/8	0/9	1/40
Theridion asopi Vanuytven, 2014	.	.	.	.	.	1/1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1/1
Platnickina tincta (Walckenaer, 1802)	*	.	.	.	.	0/1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0/1
Uloboridae																						
Uloborus plumipes Lucas, 1846	.	0/2	0/5	.	.	0/10	0/5	0/19	.	0/2	.	.	1/21	.	.	.	1/22	1/5	.	.	.	3/91
Individuals																						62/278
Species		1	2	2	5	11	4	4	8	1	2	4	2	4	2	4	7	13	7	4	10	37

mus pluchei (9) and *Uloborus plumipes* (9). The same species were the most abundant ones with different densities in the different categories (Fig. 1). *U. plumipes* was by far the most abundant species.

The number of species per locality varies between one and thirteen (Tab. 2). The highest numbers were found in the Zoo Basel (13) followed by two nurseries (Dobler Gärtnerei (11) and Merian Gärten (8)) and then the Zoo Lange Erlen and the Botanical garden with seven species each. A special case is the Railway station Badischer Bahnhof with 10 species. But here the collecting effort was clearly higher than in the other localities because the catches of an excursion with several students are included. The lowest numbers, only one or two species, were found in flower shops and logistic storage buildings.

Faunistics

In Tab. 3 a compilation of the faunistically most interesting species is presented. Three species are first records for Switzerland. Two are genuinely new for Basel, while six are published for the first time for the region of Basel, but were known already. The status "confirmed" means that these two species were already found on one occasion earlier, but could be confirmed in this research.

First records for Switzerland

Oecobius navus Blackwall, 1859

Determination. Wunderlich (1995), Roberts (1998), Le Peru (2011), Shear (1970)

Distribution. Cosmopolitan. In temperate regions synanthropic, in warmer regions also known outside buildings (Nedvěd et al. 2011).

Remarks. *Oecobius navus* is the second species of *Oecobius* known in the region of Basel. While *Oecobius maculatus* Simon, 1870 was collected only once along a railway bank (Hänggi 2003, Brenneisen & Hänggi 2006), *O. navus* seems to be well established at least in the two localities Badischer Bahnhof and Zoo Basel. Especially in the house for birds in the Zoo there was a huge population (only a few were collected).

The first observation of this species in Basel was made during an excursion with students to the Badischer Bahnhof guided by Markus Monzel in 2013.

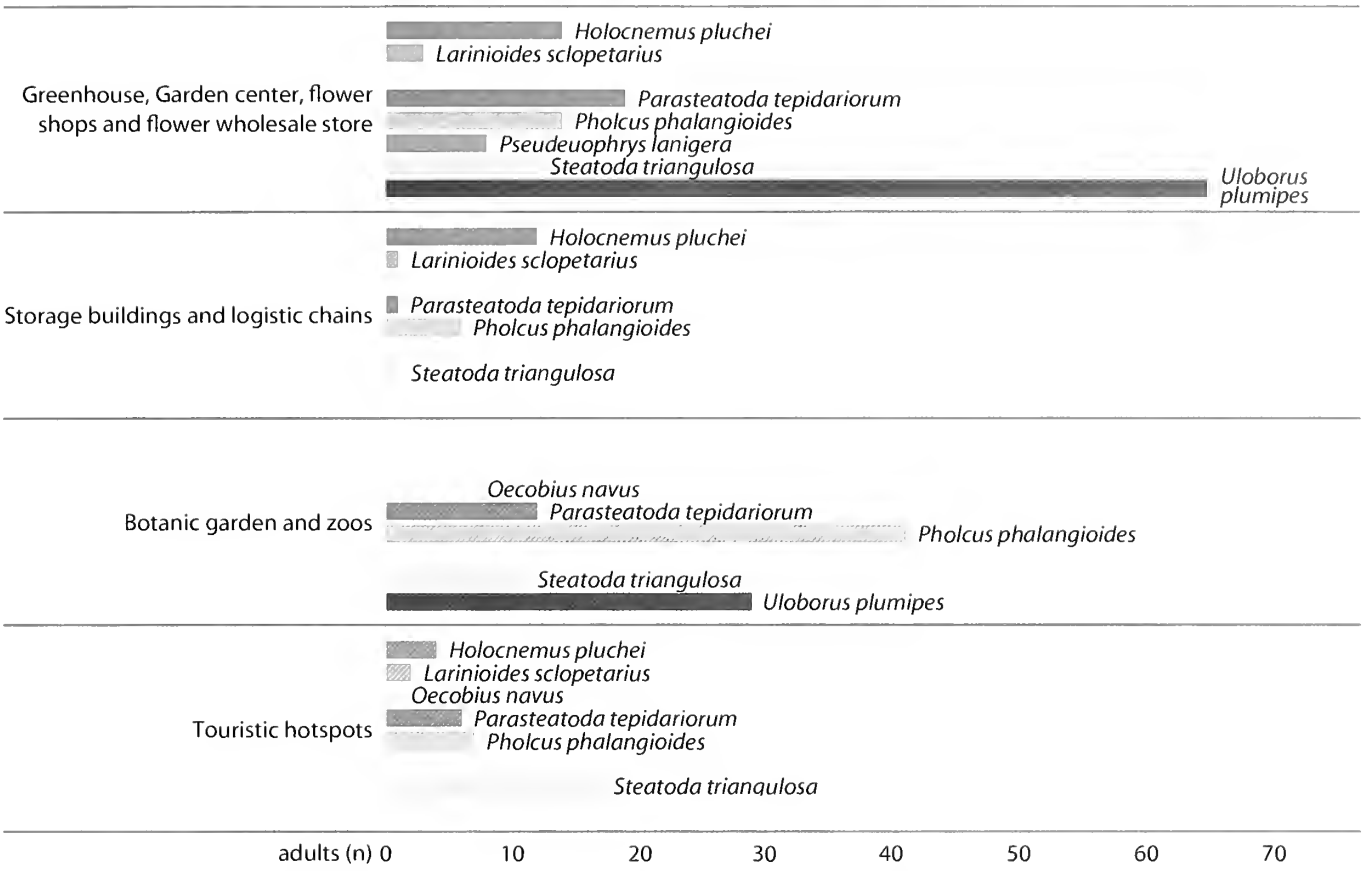

Fig. 1: Number of individuals for the most abundant species in the four groups of investigated localities

***Cryptachaea blattea* (Urquhart, 1886)**
Determination. Vink et al. (2009)
Distribution. Cosmopolitan. Vink et al. (2009) suppose an accidental anthropogenic dispersion.
Remarks. The species is already known from several European countries (e.g. Belgium: Vanuytven 2004, Germany: Sührig 2010, Great Britain: Marriott 2012) and most of the records concern agricultural or horticultural localities. Therefore it was not surprising to find the species in two nurseries in Basel. It may well be supposed that the species is to be found in more nurseries in Switzerland. Whether the species will be able to build up populations outside the nurseries in a temperate climate is not known.

***Theridion asopi* Vanuytven, 2014**
Determination. Vanuytven (2014), Roberts (1998)
Distribution. Switzerland (current findings), Belgium, France, Netherlands (Vanuytven 2014), Germany (Staudt 2015) and Italy (Pantini & Isaia 2015), mainly known from old quarries, rocks and walls of buildings.
Remarks. In contrast to the other two species *Theridion asopi* does not seem to be an alien species but rather represents a taxonomical problem. Until recently, the species was not separated from *Theridion mystaceum* L. Koch, 1870, *Theridion betteni* Wiehle, 1960 or *Theridion melanurum* Hahn, 1831.

Tab. 3: Faunistically most interesting species by groups: I) greenhouses, garden centres, flower shops and flower wholesale stores; II) storage buildings and logistic centres; III) touristic hotspots; IV) botanical gardens and zoos

Species	Status	I	II	III	IV
Coleosoma floridanum	confirmed for Basel	-	-	-	+
Cryptachaea blattea	new for Switzerland	+	-	-	-
Dictyna civica	first publication for Basel	+	+	+	-
Hasarius adansoni	confirmed for Basel	-	-	-	+
Holocnemus pluchei	first publication for Basel	+	+	+	-
Oecobius navus	new for Switzerland	-	-	+	+
Pholcus opilionoides	first publication for Basel	-	+	-	-
Psilochorus simoni	first publication for Basel	+	-	-	+
Steatoda triangulosa	first publication for Basel				
Spermophora senoculata	new for Basel	-	-	-	+
Tegenaria hasperi	new for Basel	+	-	-	-
Theridion asopi	new for Switzerland	+	-	-	-
Uloborus plumipes	first publication for Basel	+	-	-	+

New and confirmed for the region of Basel

Eight species are published for the first time for the region of Basel. Only two of these (*Tegenaria hasperi* and *Spermophora senoculata*) were not yet known from the Basel region. *T. hasperi* was recorded for the first time for Switzerland only a year ago from Tessin (Hänggi et al. 2014) and it may be supposed that it was imported accidentally. *S. senoculata* on the other hand is restricted to buildings in the northern countries of Europe and is a very tiny spider. Therefore it could be speculated that it was not recorded earlier because nobody collected (and published) in houses or it was just overlooked.

The other six species (*Brigittea civica*, *Steatoda triangulosa*, *Holocnemus pluchei*, *Pholcus opilionides*, *Psilochorus simoni*, *Uloborus plumipes*) were all already known in personal collections or represented in the collection of the NMB but were never formally published. Anyway, data of four of these species are entered in the Swiss database of the Centre Suisse de Cartographie de la Faune (CSCF 2015).

Coleosoma floridanum and *Hasarius adansoni* are recorded here for only the second time for the Basel region. The first was collected in 1999 in the botanical garden by B. Knoflach and published in Knoflach (1999) while the second was collected already on 4.10.1931 by E. Schenkel (collections of the NMB), but published only in Hänggi (2003).

The species *Uloborus plumipes*, Lucas 1846, is the most abundant spider. We found it in 12 of the 20 localities. One reason could be that the habitat requirements are good in most of the localities. Furthermore *U. plumipes* lives in the plants of nurseries, so with the transportation of plants, the spider spreads from one place to another (Reiche & Schmidt 1994). Remarkable is the colour variation of this species as illustrated in Fig. 2. At least for the females patterns from pure white to almost entirely black were found. Only four males were collected.

Discussion

The investigated localities were selected according to their potential for introduction of non-native spider species. The number of localities within the different categories varies. Even if no quantitative comparisons were intended some tendencies are obvious. So we can state, that in category I (greenhouses, garden centres, flower shops and flower wholesale stores) and IV (botanical gardens and zoos) the highest densities of spider individuals as well as the highest number of non-native spider species were observed. One explanation for the higher density in greenhouses of nurseries and in the zoological gardens could be the size of the localities and the higher diversity of habitats within the localities. It is clear that in a flower shop of 20 m² with daily cleaning there are not the

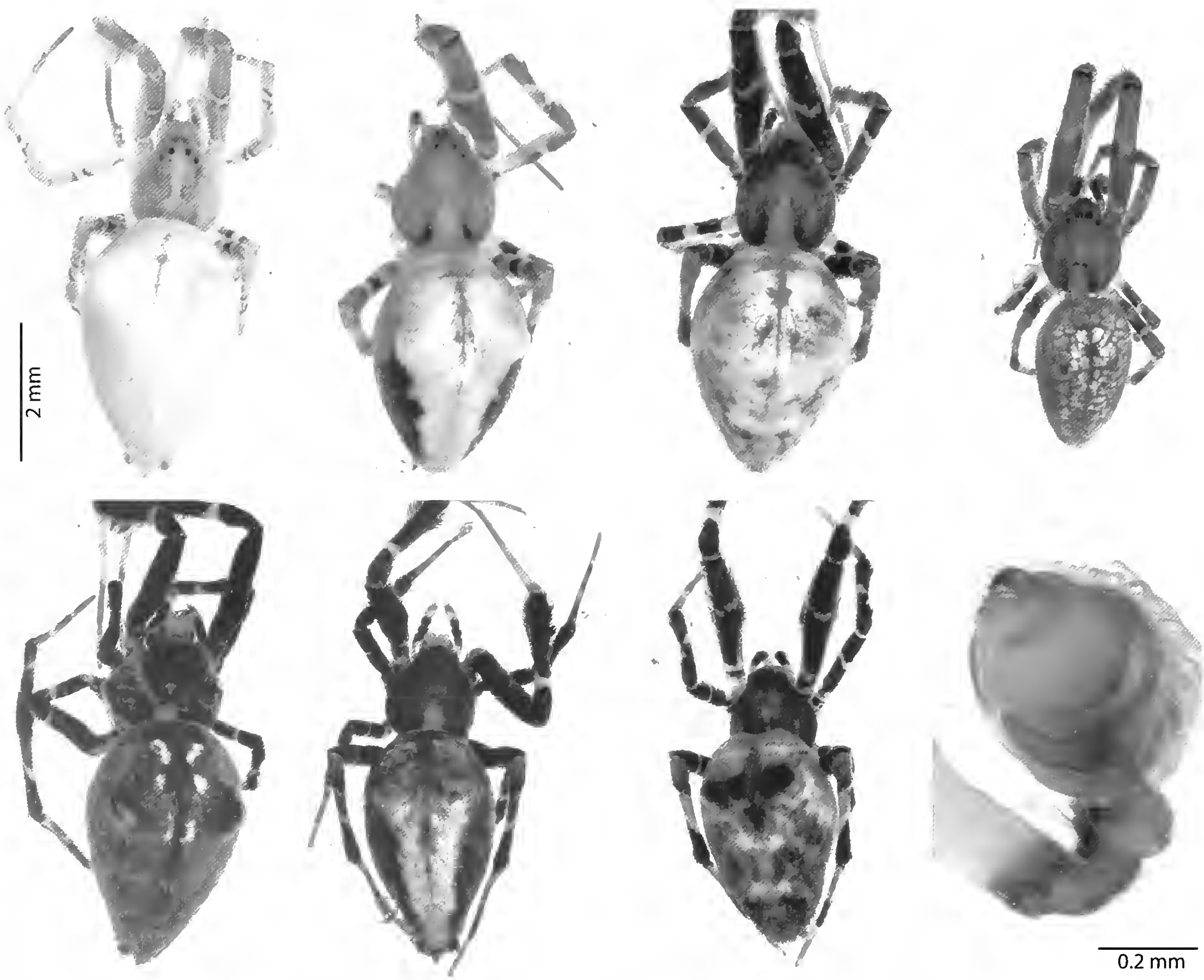

Fig. 2: *Uloborus plumipes* – colour patterns of females on the left, male on the top right and male palp on the bottom right

same ideal conditions for spiders as compared to greenhouses. In the zoological garden different buildings were investigated, which increases of the number of species.

In every category (I-VI) one species was caught in much higher numbers than the others and in every category it is a different species (Fig. 1). Even if collecting was not strictly standardised, the differences are so high that this result gives us room for interpretation of the particular habitat conditions. In category I the most abundant is *U. plumipes*, breeding in the hot and moist conditions of greenhouses. In the storage buildings and logistic centres (category II) *H. pluchei* is the most common species. This is a Mediterranean spider tolerating dusty, hostile conditions. *S. triangulosa* was the most obvious species in touristic hotspots (category IV) but was also found in 10 other localities. North of the Alps it is known as a synanthropic spider, reproducing well in and around buildings (Nentwig et al. 2015). According to these authors this species is known to have spread northwards in Europe since a few decades and was listed for Germany already by Wiehle (1937). In the collection of the NMB there is no record for Basel, even though it was familiar to E. Schenkel (record for Chiasso in Tessin, cited in Lessert 1910). In category III, botanical and zoological gardens *P. phalangioides* is the most frequent species.

There are 15 species that are by no means typical for synanthropic habitats (Tab. 2). All of these were found only as one or two individuals and always only in one locality. Twelve of these were found in greenhouses of nurseries, the botanical or zoological gardens. Such places have a high exchange with the surrounding nature. During the day windows and doors are often open and going in or out is quite easy not only for humans. The small number of collected specimens indicates that the species are only here by accident.

The data collection was done once per locality, during daytime. The collecting time depended on the size of the locality. Hand collecting is a usual method, but has disadvantages. The risk of overlooking especially small spiders is rather high and the success of collecting depends largely on the person collecting. Night-active, non-web-building spiders certainly are underrepresented. Therefore we would expect additional species if more intense collecting were to be done.

The classification for the status "new for Switzerland", "new for Basel" or "confirmed for Basel" is based first on the spider catalogue of Maurer & Hänggi (1990), second on new publications since then and third on the database of the Centre Suisse de Cartographie de la Faune (CSCF 2014). We accepted the database of the CSCF even if it may be questionable whether online databases with changing and only partly traceable distribution data should be accepted as published data in a strict sense. But even then, the example of *B. civica* (Lucas, 1850) shows that a species can already be known at a place since decades, but has never been published one way or the other.

Apart from private collections there is one source of further information: museum collections. Unfortunately these very often are not (yet) published but by definition should be, and mostly are, accessible to every researcher. The fact, that in our investigation six species are published for the first time for the region of Basel even if they were known in private collections before, shows the importance of publishing such collections especially when discussing distributions and invasiveness of species.

Conclusion

This paper pursues two main goals. When we talk about non-native species, then we have to know what exactly exists already at a given place. Our quite small collection had two goals: First to just obtain an inventory of synanthropic spiders in the investigated localities. The second goal was to publish new and not yet published spider species. We could find three new records for Switzerland and eight new records for Basel. Even if some of these were known for a long time, but not published, this confirms that the entry of non-native species exists and perhaps occurs every day. Until now we do not know anything about potentially dangerous species, but it could be useful to keep an eye on places where the import of alien species is most suspected. And any information on such imported species should be published formally to become known to the scientific community.

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A new species of *Berinda* (Araneae, Gnaphosidae) from the eastern Aegean Islands, Greece

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Abstract. A new ground spider, *Berinda idae* Lissner **spec. nov.** is described from material collected in Kalymnos and Nisyros of the Dodecanese Islands, as well as Santorini and Christiani of the Thira island complex, Cyclades, Greece. The affinity of this species to its congeners is briefly discussed.

Keywords: Cyclades, Dodecanese, taxonomy, *Zelotes* group

Zusammenfassung. Eine neue Art der Gattung *Berinda* (Araneae, Gnaphosidae) von den östlichen Ägäischen Inseln, Griechenland. Eine neue Plattbauchspinne, *Berinda idae* Lissner **spec. nov.**, wird aus Material, das auf den griechischen Inseln Kalymnos und Nisyros (Dodekanes) sowie auf Santorin und Christiani (Thira-Inseln, Kykladen) gesammelt wurde, beschrieben. Die Beziehungen zu den anderen Arten der Gattung werden kurz diskutiert.

Berinda Roewer, 1928 belongs to the *Zelotes* Group within the Gnaphosidae (Panayiotou et al. 2010). Members of this group possess a distal preening comb on metatarsi III and IV and this character is not possessed by any other gnaphosid group (Murphy 2007). Preening combs are specialised brush-like setae emerging from a relatively straight row of bases on metatarsi III and IV that are used for grooming purposes (Platnick & Shadab 1982, FitzPatrick 2007). Within the *Zelotes* Group, *Berinda* males are easily distinguished by the very characteristic conductor guiding the long embolus of the pedipalp, while females stand out by possessing a large hood anterior to the introductory ducts and spermathecae (Kovblyuk et al. 2009). The genus has recently been revised by Panayiotou et al. (2010) adding two new species to the three already described. A sixth species, *Berinda cooki* was later described from Turkey, based on the male only (Logunov 2012). Thus, *Berinda* is a small genus with just six species distributed in the East Mediterranean, Turkey and Uzbekistan (Logunov 2012, Panayiotou et al. 2010).

Material and methods

The material presented here originates from a systematic survey on some islands belonging to the Dodecanese and Cyclades complexes in the framework of a scientific project undertaken by the Natural History Museum of Crete, or NHMC (see acknowledgements for details) and from other field trips of the first and second author in the same areas. Spiders were collected by pitfall traps in the case of NHMC material and sought by hand, by sifting leaf litter in a tray and by shaking vegetation above a tray in the case of the first author's collection. All NHMC material is deposited at the same museum. Material of the first author's collection will be deposited at the Zoological Museum of Copenhagen. Leg spination data is presented as number of dorsal, ventral, prolateral, and retrolateral spines on all leg segments except the tarsi. Illustrations were created by the first author, from photos of selected features using a Leica Wild M10 stereomicroscope fitted with Leica DFC425 digital camera connected to a computer with the Leica Application Suite software v. 4.3.0, Zerene Stacker software v. 1.04 and vector graphics editor Inkscape v. 0.48.

Abbreviations. NHMC: Natural History Museum of Crete; ZMUC: Zoological Museum of Copenhagen; TL: total length; PL: prosoma length; PW: prosoma width; OL: opisthosoma length; CJL: coll. Jorgen Lissner. Leg spination d: dorsal; v: ventral; p: prolateral; r: retrolateral.

Results

Berinda idae Lissner spec. nov. Figs 1-7

The species here described is assigned to *Berinda*, based on the presence of a combination of characters that is not shared with any other gnaphosid genera (Murphy, 2007): preening combs, epigynal hood, large conductor of the male palp protruding ventrally in the middle of the embolus loop.

Etymology. The species is named *idae* to pay tribute to Ida Louise Lissner, daughter of the first author.

Type material. Holotype ♂: GREECE: Cyclades: Thira Islands: Santorini, Profitis Ileias, phrygana (36.3691N 25.4620E), pitfalls 17.V.2003 – 24.VIII.2003, leg. Chatzaki, stored at NHMC [NHMC17283]. Paratypes 1 ♂ 2 ♀♀, same data.

Other material examined. GREECE: Cyclades: Thira Islands: Santorini: Vlichada (36.3418N 25.4323E), phrygana 16 ♂♂ 10 ♀♀ [pitfalls 23.IV.2006 – 14.VII.2006, leg. Chatzaki, NHMC8478], 2 ♂♂ 2 ♀♀ same data of which one male was used for the palp illustrations [CJL-10869]; Oia (36.4691N 25.3733E), phrygana 1 ♀ [pitfalls 17.V.2003 – 24.VIII.2003, leg. Chatzaki, NHMC17282]; Christiani Islet (36.2502N 25.2071E), phrygana 1 ♂ 5 ♀♀ [pitfalls 11.IV.2006 – 14.VII.2006, leg. Chatzaki, NHMC8490]; Dodecanese Islands: Nisyros, Avlaki (36.5591N 27.1733E), phrygana 1 ♀ [pitfalls 01.V.2006 - 05.VI.2006, leg. Chatzaki,

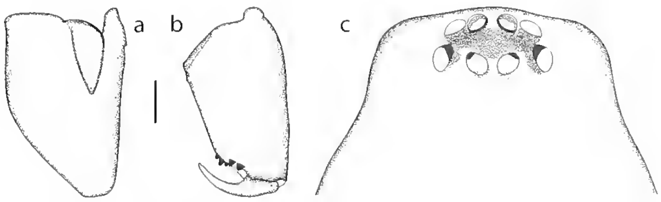

Fig. 1: *Berinda idae* Lissner spec. nov. ♀. a) Left chelicera in prolateral view with the outline of the lateral condyle emphasized. b) Right chelicera in posterior view showing positions of teeth on pro- and retromargin. c) Eye region in dorsal view. Scale bar 0.2 mm

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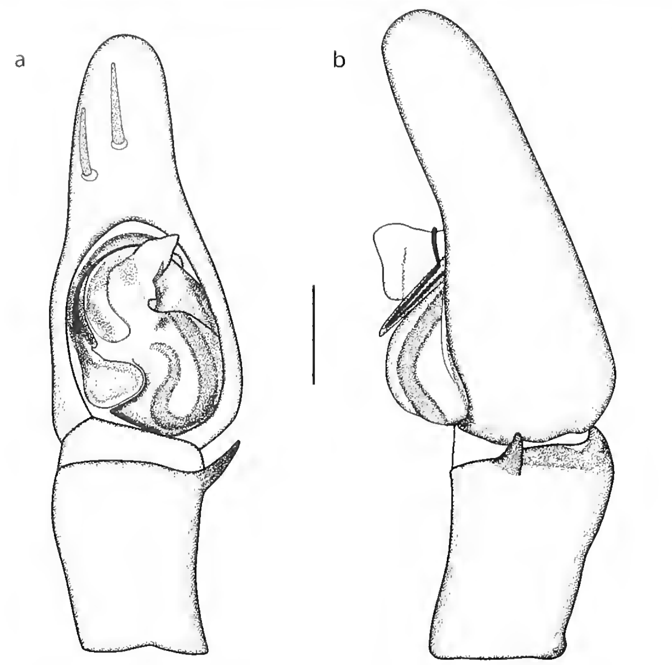

Fig. 2: *Berinda idae* Lissner spec. nov. ♂. a) Left male palp in ventral view. b) Same in retrolateral view. Scale bar 0.2 mm

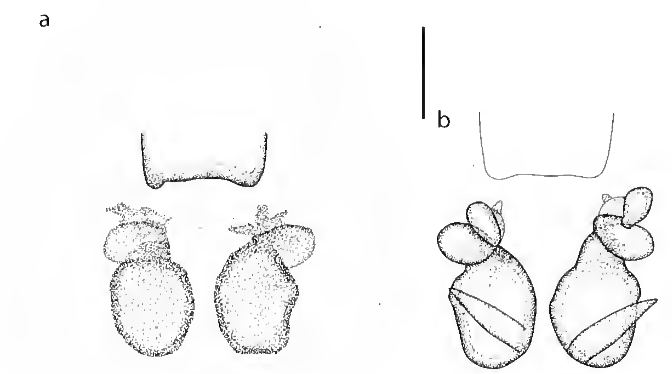

Fig. 3: *Berinda idae* Lissner spec. nov. ♀. a) Epigyne in ventral view. b) Vulva in dorsal view. Scale bar 0.1 mm

NHMC8406]; Kalymnos, ca. 300 m SE of the monastery of Agios Savvas near Pothia (36.9431N 26.9835E), 1 ♀ (used for illustrations) found among stones in open forest community with pine trees and phryganic species in understory stratum [30.VI.2010, leg. Lissner, CJL-6843].

Diagnosis. The male of the species described here differs from those of all other *Berinda* species by possessing a small, triangular tibial retrolateral apophysis, about one fifth the length of palpal tibia. In all other *Berinda* males the tibial apophysis is considerably longer or, in the case of *B. amabilis* Roewer, 1928, short but with an additional finger-like patellar apophysis (Panayiotou et al. 2010). The shape of the membraneous part (sac or bladder, sensu Panayiotou et al. 2010) of the conductor is highly distinctive in each species being approximately triangular in retrolateral view in the present species. The female of *B. idae* Lissner spec. nov. possesses a short, rectangular epigynal hood, about twice as wide as long, unlike those of any other known *Berinda* females. The spermathecae are oval in shape and distinctly separated. In the five already described species (female of the sixth *B. cooki* is unknown) the spermathecae are almost touching or overlapping, and all those species, except *B. amabilis*, have kidney-shaped spermathecae.

Description. Measurements (mm, n = 3, average value with range in parenthesis): ♂: TL: 6.6 (4.5-8.2), PL: 3.1 (2.2-3.9), PW: 2.2 (1.6-2.6), OL 3.7 (2.5-4.5); ♀: TL: 7.0 (6.8-7.4), PL: 3.0 (2.5-3.7), PW: 2.2 (1.7-2.6), OL 4.2 (3.8-4.6). ♂♀: Carapace yellow-brown with distinct fovea (Fig. 6), very faint radiating striae, abdomen elongated oval, covered with pubescence giving it light greyish brown appearance. Legs coloured as carapace, all segments uniformly plain-coloured. Chelicerae with lateral condyles (Fig. 1a). Cheliceral retromargin with 2 teeth, promargin with 3, relatively smaller teeth, median tooth being largest (Fig. 1b). In some specimens promargin carries 2 additional, minute denticles towards fang. Endites, labium, sternum, coxae (Fig. 7) almost identical in shape to those depicted for *Berinda amabilis* in Murphy (2007). Coxae I longer, thinner than coxae IV as characteristic for members of the *Zelotes* group. Eyes in two rows, anterior row slightly recurved, posterior row procurved with posterior median eyes oblique (Fig. 1c). Area enclosed by eyes darkened. Spinnerets long, cylindrical, anterior pair clearly longer than posterior pair, separated by ca. diameter of spinneret. Each anterior lateral spinneret with pair of small major ampullate gland spigots anterior to 6 piriform gland spigots packed parallel both to each other and to surface of distensible membrane when in resting stage. Presumably, when membrane is fully expanded piriform spigots will attain positions very much like those illustrated for *B. amabilis* in Murphy (2007). All

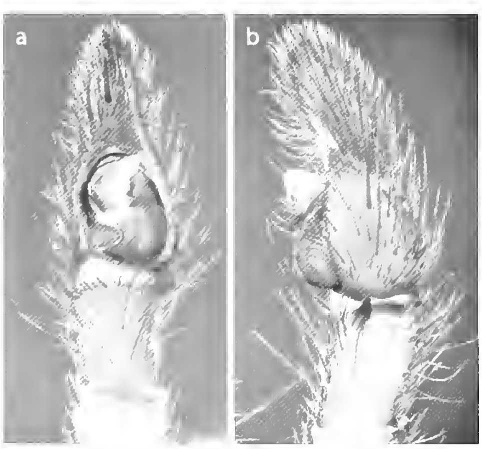

Fig. 4: *Berinda idae* Lissner spec. nov. ♂, photographs; a) Left male palp in ventral view. b) Same in retrolateral view. For scale see fig. 2

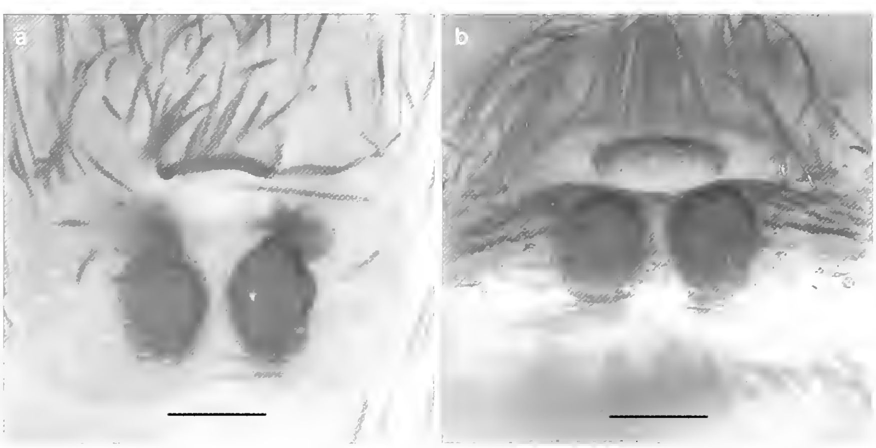

Fig. 5: *Berinda idae* Lissner spec. nov. ♀. a) Epigyne photographed in ventral view; b) Epigyne photographed in posterior view showing curvature of hood. Scale bar 0.1 mm

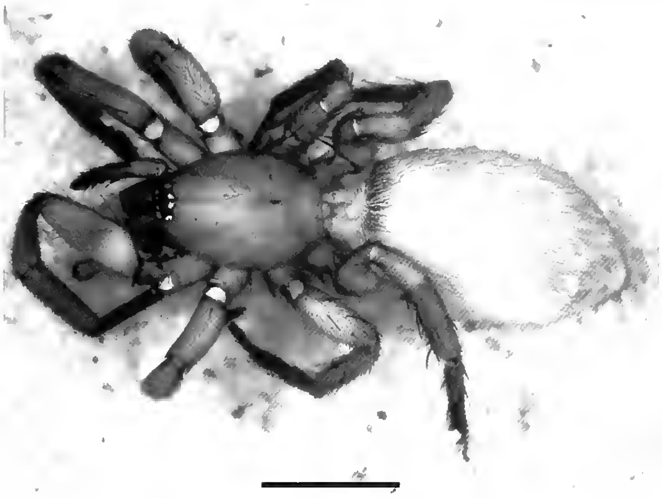

Fig. 6: *Berinda idae* Lissner spec. nov. ♀. Habitus in dorsal view. Scale bar 2 mm

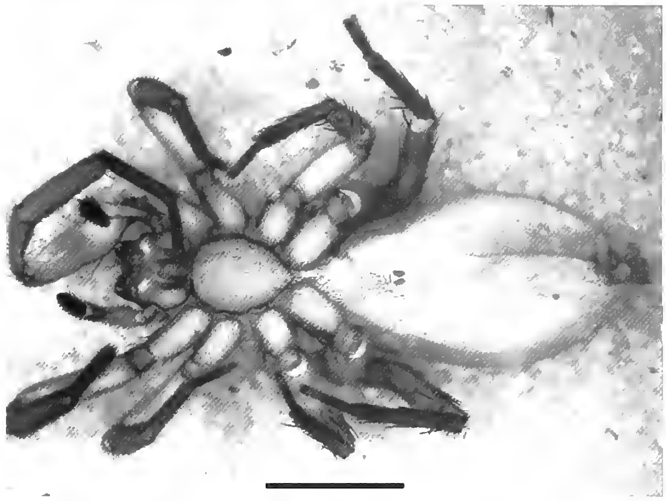

Fig. 7: *Berinda idae* Lissner spec. nov. ♀. Habitus in ventral view. Scale bar 2 mm

leg tarsi with scopulae extending to distal parts of metatarsi. Preening combs present on metatarsi III, IV. Leg spination ♂: Fe: I-II d2 r1; III d3 p2 r2; IV d2 p1-2 r1. Pa: I–II 0; III p1 r1; IV 0. Ti: I 0; II v3; III d1-2 p4 r3 v6; IV: d0 p4 r4 v6. Me: I 0; II v3; III p5 r4 v4; IV p5 r6 v6. Spination of ♀ as in ♂ but Ti: II 0-1; III d1 p4 r3 v6; IV: d1-2 p4 r4 v6. Me: III p5 r3 v4. Ventral spines arranged in two rows on each side of ventral midline. Pro-, retrolateral spines arranged in two rows, if more than one spine. Most conspicuous difference between the sexes appears to be number of ventral spines on tibia II (3 in males, 0-1 in females). Male palp with small triangular tibial apophysis, strongly protruding filiform conductor (Figs 2, 4). Embolus long, filiform. Conductor with large membraneous sac best seen in retrolateral view (Figs 2b, 4b). Epigyne with hood about twice as wide as long, curved in postrior view (Figs 3a, 5a, 5b). Spermathecae (Figs 3a-b) oval, separated by one third their diameter. Genital openings horizontal, situated near anterior part of spermathecae. Introductory ducts short, wide, stout, coiled, not allowing detection of line towards spermathecae.

Distribution. GREECE: Dodecanese (Kalymnos, Nisyros), Cyclades (Santorini, Christiani Islet).

Discussion

The species of *Berinda* are easily separated by their genitalia as both the palpal organs and the epigynes are distinctive in each species. *Berinda idae* Lissner spec. nov. makes no exception and does not seem closely related to its congeners, *B. aegilia* Chatzaki, 2002 being the closest so far, based on most morphological characters.

Until now only *B. ensigera* was known from the Dodecanese Islands (Panayiotou et al. 2010) and it is the first time a member of the genus has been recorded from the Cyclades.

Acknowledgements

Part of the material presented in this study originates from field work included in the program PYTHAGORAS I "Multilevel approach of biodiversity on four island groups in the east Aegean" and co-funded by the European Union (75%) and by the Operational program EPEAEK II (Education and Initial Vocational Training) of the Ministry of National Education and Religious Affairs. We wish to thank Dr P. Lymberakis, Dr D. Kaltsas, M. Nikolakakis and K. Madi for their valuable help during field trips and for the sorting of arthropod material.

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A collection of sea spiders (Pycnogonida: Pantopoda) in the National Museum, Prague (Czech Republic)

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Abstract. The arachnological collection of the National Museum, Prague contains material preserved in ethanol and a microscopic slide of recent sea spiders (Pycnogonida: Pantopoda). The collection is small, containing only twelve specimens. A revision of all of them revealed the presence of nine species from five families: *Anoplodactylus lentus* Wilson, 1878, *Boreonymphon abyssorum* (Norman, 1873), *Callipallene* sp., *Endeis spinosa* (Montagu, 1808), *Nymphon grossipes* (Fabricius, 1780), *Nymphon hirtipes* Bell, 1853, *Nymphon stroemi* Krøyer, 1844, *Nymphon tenellum* (Sars, 1888) and *Pycnogonum litorale* (Ström, 1762). The material preserved in ethanol was collected in the North Atlantic Ocean and adjacent seas, the pycnogonid mounted on the slide was collected in Mediterranean. Four of the sea spiders came from the Sars collection (Bergen, Norway) and four specimens came from the V. Frič collection (Prague, Czech Republic). From these two sources, six specimens were mounted for exhibition and educational purposes. Although the collection contains no types, it introduces an interesting group of marine animals.

Keywords: Callipallenidae, Endeidae, Frič, Nymphonidae, Phoxichilidae, Pycnogonidae, Sars, zoological collection

I would like to dedicate this paper to two scientists who passed away in 2015: Roger Norman Bamber, a specialist on Pycnogonida, and Jan Buchar, an arachnologist and my supervisor.

Sea spiders (Pycnogonida) are strange looking, exclusively marine invertebrates feeding on sessile or slow-moving (or sometimes dead) animals. However, catching quick-moving prey was also reported (Lotz 1968). They are often considered the sister group of Euchelicerata, i.e. a class of the subphylum Chelicerata but alternative hypothesis also exist – see Dunlop et al. (2014) for a review.

Their body, termed the trunk, is extremely reduced and serves just as attachment for the legs. The first segment, the cephalosoma, contains four primordial segments that are telescoped into the first trunk segment – the first for an ocular tubercle with four eyes (may be absent) and a proboscis, and the next three giving rise to the appendage pairs of the chelifores, palps and ovigers. The fourth pair of appendages in the cephalosoma is the first pair of walking legs and belongs to the trunk (Winter 1980). Behind the cephalosoma, there are three trunk segments, each bearing a pair of nine-articled walking legs comprised from coxa 1, coxa 2, coxa 3, femur, tibia 1, tibia 2, tarsus, propodus and the main claw. There has been long-lasting controversy concerning which appendages are homologous among arthropods. According to Jager et al. (2006), Manuel et al. (2006) and Brenneis et al. (2008), the pycnogonid appendages are homologous to those of euchelicerates and mandibulates as follows: chelifores ~ chelicerae ~ antennae I (innervated from deutocerebrum), palps ~ pedipalps ~ antennae II (innervated from tritocerebrum), ovigers ~ legs I ~ mandibles, legs I ~ legs II ~ maxillae I, legs II ~ legs III ~ maxillae II. The last (fourth) trunk segment bears the abdomen which is reduced to a small protuberance.

The reduced body of sea spiders causes several organ systems, like the intestine and gonads, to protrude into the legs, such that the genital openings are often located on the ventral surface of coxa 2 (usually of legs III and IV). Eggs are stored in the femora of all legs of the female. The typical first larval form (feeding on cnidarians), the protonymphon, usually hatches from the eggs that are carried by the male in many families. The larval body possesses a proboscis, chelifores and two pairs of ambulatory legs that turn into palps and ovigers during ontogeny. Information about biology of sea spider can be found in Arnaud & Bamber (1987).

Catalogues of sea spiders were published by museums in Germany (Dunlop et al. 2007, Weis et al. 2011, Lehmann et al. 2014). The National Museum in Prague has already published catalogues of various non-type zoological material (e.g. Jiroušková et al. 2011, Mlíkovský et al. 2013, Dolejš & Vaňousová 2015) and this paper continues by providing information about the sea spider collection in Prague.

Material and methods

All eleven ethanol-preserved pycnogonid specimens are kept in 80 % ethanol. Eight of them had been identified, three (plus the specimen mounted on the slide) only to genus level. Therefore, all specimens were first revised based on the literature mentioned below each species. Of the formerly identified specimens, only two of them had been identified correctly. Thus, labels with appropriate species names were put on the jars. Second, specimens were cross-referenced with the accessory catalogues. However, data for only four specimens were found in the catalogues (Nºs 1876/1902, 19/1960/3066 and 19/1960/3109); the remaining specimens thus have a "general" number for Pycnogonida: P6d-9/2003 (P6j-118/1988 for the specimen mounted on the slide). Conversely, one specimen was not found in the collection despite being mentioned in the accessory catalogue from the year 1902: *Colossendeis proboscidea* (Sabine, 1824) from Bjornøya ("W von Bären Insel"). This specimen had come to the National Museum in Prague as an exchange from the Museum für Naturkunde Berlin on 21 October 1902 (accessory Nº 1875/1902), but was either lost or destroyed. The remaining specimens in Berlin are deposited under Nº ZMB 19 (Dunlop et al. 2007).

The third step was the determination of sex and measuring body lengths using an Olympus SZX12 stereomicroscope equipped with an ocular micrometer. Males were recognized by the presence of cement gland openings and hairy swellings located distally on the fifth article of the ovigers helping the

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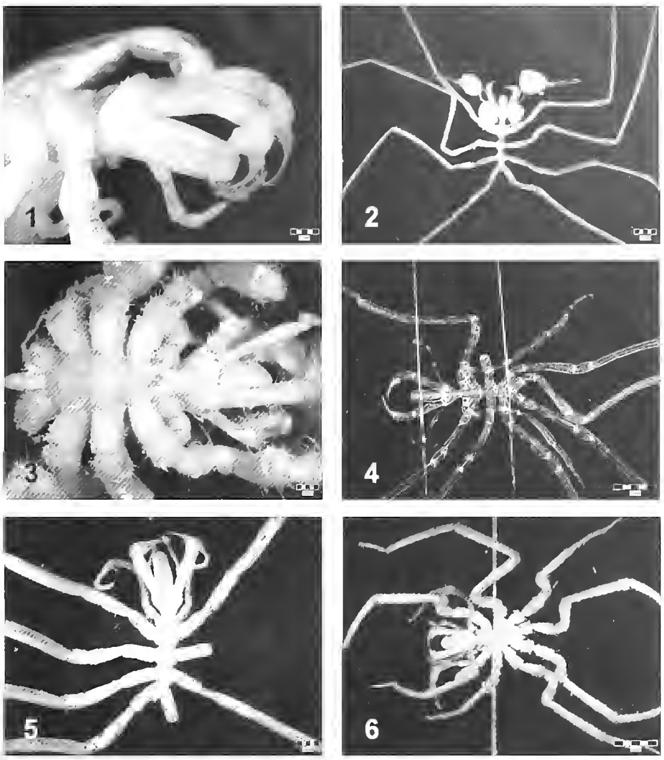
(nymphonid) males in carrying the eggs. Females were recognized according to the swollen femora of the legs (and sometimes eggs visible inside them) without cement glands and missing ovigers (except members of the families Callipallenidae and Nymphonide where ovigers are also present in females but the swellings are lacking) (Bamber 2010). The body length in sea spiders means the distance between the anterior margin of the cephalosoma (i.e. without the proboscis) and posterior margin of the last (fourth) segment including the lateral processes but not the abdomen (Just 1972, Bamber 2010).

Current nomenclature and the Life Science Identifier numbers (lsid) were adopted from PycnoBase (Bamber et al. 2015). The species are arranged systematically according to Bamber (2010). Data for each specimen are arranged as follows: Material – number of specimens (with a note in the case they are mounted), their sex (body length), name of the collector, date of collection and locality. Identification – name on the original label and literature used for revision/redetermination/identification. Biology and ecology – any available data. Notes – if any.



Figs 1-6: Nymphonidae. **1.** *Boreonymphon abyssorum*, lateral view of the anterior part of the female body; **2.** *Nymphon grossipes*, an ovigerous male; **3.** *Nymphon hirtipes*, a male with malformed left chelifore; **4.** *Nymphon stroemi*, a mounted subadult specimen from Bergen; **5.** *N. stroemi*, a juvenile from the North Sea; **6.** *Nymphon tenellum*, a male from Bergen. Scale bars 1 mm (Figs 1, 3), 2 mm (Figs 2, 5), 5 mm (Figs 4, 6)

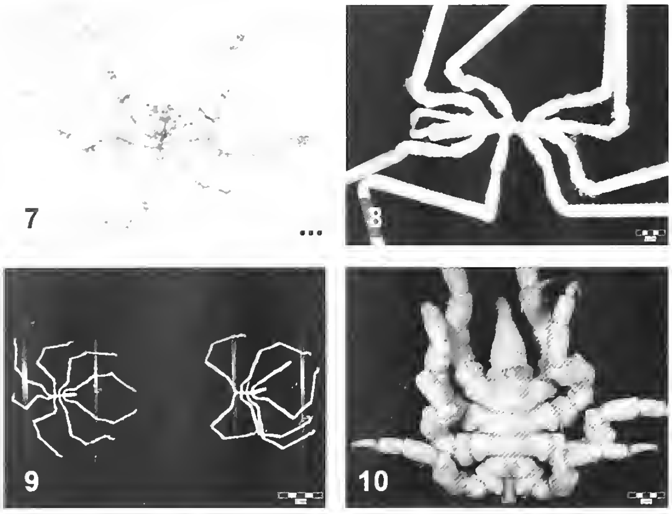
Systematic list
Class: Pycnogonida Latreille, 1810
Order: Pantopoda Gerstäcker, 1863
Suborder: Eupantopoda Fry, 1978
Superfamily: Nymphonoidea Pocock, 1904
Family: Nymphonidae Wilson, 1878
Genus: *Boreonymphon* Sars, 1888
***Boreonymphon abyssorum* (Norman, 1873)**
urn:lsid:marinespecies.org:taxname:134676
Material. 1 ♀ (7.0 mm) collected by F. A. Dohrn on an unknown date in the Barents Sea, RUSSIA (Fig. 1).
Identification. Originally labelled as *Boreonymphon robustum* Bell, redetermined according to Just (1972) and Bamber (2010).
Biology and ecology. Depth 500-2000 m (Bamber 2010).
Notes. Came to the National Museum as an exchange from the Museum für Naturkunde Berlin on 21 October 1902 (accessory № 1876/1902). The remaining specimens in Berlin are deposited in two vials under № ZMB 64 and are labelled as *B. robustum* (Dunlop et al. 2007). It is probable that they were also erroneously identified and that they are in fact *B. abyssorum* like the specimen deposited in Prague.

Genus: *Nymphon* Fabricius, 1794
***Nymphon grossipes* (Fabricius, 1780)**
urn:lsid:marinespecies.org:taxname:134688
Material. 1 mounted pair: ♂ (5.5 mm) and ♀ (4.8 mm) without any data; ex. coll. V. Frič (№ 19/1960/3066) (Fig. 2).
Identification. Originally labelled as *Nymphon* sp., identified according to Turpaeva (2009), Bamber (2010) and de Kluijver & Ingalsuo (2015).
Biology and ecology. Depth usually 6-400 m (Bamber 2010), on silty sand, rock and shells (Turpaeva 2009).

***Nymphon hirtipes* Bell, 1853**
urn:lsid:marinespecies.org:taxname:134690
Material. 1 ♂ (8.0 mm) collected by an unknown collector on an unknown date in the Davis Strait; ex. coll. V. Frič (№ 19/1960/3109) (Fig. 3).
Identification. Originally labelled as *Chaetonymphon hirtipes*, revised according to Hedgpeth (1948), Child (1982) and Turpaeva (2009).
Biology and ecology. Depth 3-1506 m, on silty sediments (Turpaeva 2009).
Note. Left chelifore malformed and left oviger with extra projections.

***Nymphon stroemi* Kroyer, 1844**
urn:lsid:marinespecies.org:taxname:134711
Material. 1 mounted subadult specimen (8.0 mm) collected by an unknown collector on an unknown date in Bergen, NORWAY; ex. coll. Sars (Fig. 4).
Identification. Originally labelled as *Nymphon grossipes* Fabr., redetermined according to Turpaeva (2009), Bamber (2010) and de Kluijver & Ingalsuo (2015).
Material. 1 juvenile specimen (8.3 mm) collected by an unknown collector on an unknown date in the North Sea (Fig. 5).
Identification. Originally labelled as *Nymphon* sp., identified according to Turpaeva (2009), Bamber (2010) and de Kluijver & Ingalsuo (2015).
Biology and ecology. Depth 12-1300 m (Bamber 2010), on silty sediments (Turpaeva 2009).

***Nymphon tenellum* (Sars, 1888)**
urn:lsid:marinespecies.org:taxname:134712
Material. 1 mounted ♂ (5.2 mm) collected by an unknown collector on an unknown date in Bergen, NORWAY; ex. coll. Sars (Fig. 6).



Figs 7-10: Non-nymphonid sea spiders. **7.** *Callipallene* sp., a juvenile mounted on a microscopic slide, scale bar 0.5 mm; **8.** *Anoplodactylus lentus*, a female from Woods Hole, scale bar 1 mm; **9.** *Endeis spinosa*, two mounted females, scale bar 5 mm; **10.** *Pycnogonum litorale*, a female from Puffin Island, scale bar 2 mm

Identification. Originally labelled as *Nymphon hirtum* F., redetermined according to Child (1982), Bamber (2010) and de Kluijver & Ingalsuo (2015).
Biology and ecology. Depth mainly 200-600 m (Bamber 2010). Glandular secretions used by paternal care were described by Dogiel (1911, sub *Chaetonymphon spinosum*).

Family: Callipallenidae Hilton, 1942
Genus: *Callipallene* Flynn, 1929
***Callipallene* sp.**
Material. 1 juvenile specimen (0.7 mm) mounted on a microscopic slide, collected by F. B. Liechtenstern, on 24 September 1879 in Rovinj, CROATIA (Fig. 7).
Identification. Originally labelled as *Pycnogonum*, redetermined according to Bamber (2010), Lehmann et al. (2014) and de Kluijver & Ingalsuo (2015).
Biology and ecology. The callipallenids show a direct development via a postlarva on the male (Bamber 2010).
Note. Five common *Callipallene* species occur in Mediterranean (Lehmann et al. 2014).

Superfamily: Phoxichilidioidea Sars, 1891
Family: Phoxichilididae Sars, 1891
Genus: *Anoplodactylus* Wilson, 1878
***Anoplodactylus lentus* Wilson, 1878**
urn:lsid:marinespecies.org:taxname:158478
Material. 1 ♀ (3.5 mm) collected by an unknown collector in July 1891 in Woods Hole, USA (Fig. 8).
Identification. Originally labelled as *Phoxichilidium maxillare*, redetermined according to Hedgpeth (1948) [generic placement also according to Turpaeva (2009) and Bamber (2010)].
Biology and ecology. Ontogeny was described by Morgan (1891, sub *Phoxichilidium maxillare*) and the coloured granules in the hemolymph by Dawson (1934).

Family: Endeidae Norman, 1908
Genus: *Endeis* Philippi, 1843
***Endeis spinosa* (Montgau, 1808)**
urn:lsid:marinespecies.org:taxname:134674
Material. 2 mounted (from dorsal and ventral view) ♀♀ (2.2 mm) collected by an unknown collector on an unknown date in Bergen, NORWAY; ex. coll. Sars (Fig. 9).
Identification. Originally labelled as *Pallene spinipes* F., redetermined according to Bamber (2010) and de Kluijver & Ingalsuo (2015).
Biology and ecology. Mainly from the littoral zone to depths of 40 m, feeding on hydroids, but also common on algae (Bamber 2010). Ontogeny was described by Dogiel (1913, sub *Phoxichilus spinosus*).

Superfamily: Pycnogoidea Pocock, 1904
Family: Pycnogonidae Wilson, 1878
Genus: *Pycnogonum* Brünnich, 1764
***Pycnogonum litorale* (Ström, 1762)**
urn:lsid:marinespecies.org:taxname:239867
Material. 1 ♀ (6.3 mm) collected by J. Thompson on an unknown date at the Puffin Island Biological Station, UNITED KINGDOM (Fig. 10).
Identification. Originally labelled as *Pycnogonum litorale*, revised according to Turpaeva (2009), Bamber (2010) and de Kluijver & Ingalsuo (2015).
Biology and ecology. From the littoral to 1262 m, feeding on sea anemones (Bamber 2010), on rocky, stony sediments (Turpaeva 2009). *Pycnogonum litorale* became one of the model species for studying various aspects of sea spiders (e.g. Vilpoux & Waloszek 2003, Ungerer & Scholtz 2009, Machner & Scholtz 2010) given its fairly well known biology (e.g. Tomaschko et al. 1997, Wilhelm et al. 1997 and references therein).

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A checklist of the spiders (Araneae) of the Chornohora Mountain massif (Ukrainian Carpathians)

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Abstract. The present checklist of spiders native to the Chornohora Mts of the Ukrainian Carpathians is based both on literature-derived data and on material collected by the authors in 1999, 2006 and 2011-2014. The majority of these studies (approximately 80 %) were conducted in the upper montane forests, subalpine and alpine levels on the slopes of the main ridge and adjacent spurs and mountains. The study also covers glacial cirques and river valleys. A few spiders were collected from local villages. The list of spiders includes records from the collections of the Museum of Natural History of the Wroclaw University and Museum (Poland) and the Institute of Zoology, Polish Academy of Sciences, Warsaw. A total of 252 valid species from 22 families is known from the Chornohora Mt. massif.

Keywords: fauna, Ukraine

Zusammenfassung. Eine Checkliste der Spinnen (Araneae) des Chornohora Gebirgsmassifs (Ukrainische Karpaten). Die vorliegende Checkliste der Spinnen des Chornohora Gebirges in den Ukrainischen Karpaten umfasst sowohl Literaturdaten als auch Aufsammlungen der Autoren in den Jahren 1999, 2006 und 2011 bis 2014. Die meisten dieser Arbeiten (ca. 80 %) wurden in montanen Wäldern sowie an den subalpinen und alpinen Hängen des Hauptkammes und der Nebenkämme durchgeführt. Weitere Daten stammen aus den Gletscherbereichen, Flusstälern und Siedlungsbereichen. Die Checkliste umfasst auch Funde der Sammlungen der Universität und des Naturkundemuseums Breslau und des Institutes für Zoologie der Polnischen Akademie für Wissenschaften in Warschau. Insgesamt werden für das Chornohora Gebirge 252 Arten aus 22 Familien dokumentiert.

The Chornohora Mountain massif is one of the most famous areas of the Ukrainian Carpathians. The first research on spiders in this region was conducted by Leopold Wajgiel, the co-founder of the Chornohora branch of the Tatra Society (1878). In his papers devoted to the fauna of Galicia, Wajgiel provided data on 9 spider species collected from the massif [Czarnogóra: coll. M. Łomnicki] (Wajgiel 1868).

In 1876-79, while analyzing the spider fauna of Hungary, A. Herman noted one species from Mt. Petros [Pietrosz: coll. J. Pavel] (Herman 1879).

At the turn of the 19th to the 20th century, a comprehensive collection from the Chornohora Mts was brought together by the famous arachnologist Wladyslaw Kulczyński (based on material from his colleagues and friends). Some data were published in the work "Araneae Hungariae". Among them were 33 species from Mt. Petros (Pietroz: coll. Chyzer), and eight from Mt. Hoverla (Hoverla: coll. J. Pavel, J. Mathiasz; Chyzer & Kulczyński 1891, 1894, 1897, 1918). Unfortunately, the rest of the collection from this massif was never published and remains to be studied. Only information about a species from the Chornohora massif (field name Ardzheluzha: author's note), *Zora distincta* Kulczyński, 1915, was listed in the Catalogue of Spiders of Poland (Prószyński & Staręga 1971).

From 1912 onwards in some territories of the Chornohora Mts the government of Galicia began to create nature reserves and the territory of protected areas was increased, despite the changing territorial subdivision of Eastern Europe, as well as Transcarpathia. This initiated a series of new large-scale inventory studies of the flora and fauna. In 1935 and 1939, Polish scientists produced checklists of many groups of invertebrates from the massif (Fudakowski et al. 1939). Information about spiders was never published, and then the planned faunistic study of the territory was interrupted by World War II. Yet, the spider fauna of the massif under consideration is represented by twelve species deposited in the collection of the Polish arachnologist Stanislaw Pilawski (Hoverla Mt., Breskul Mt., Dancer Mt., Rebra Mt., Shpytsi Mt., field names Zarosliak and Foreshchanka, mountain ranges Kukul and Rozshybenyk, vil. Voronenko; coll.: 1933-1938; Museum of Natural History, Wroclaw University).

The Czechoslovakian arachnologist J. Baum in his papers presented data about three spider species from Mt. Hoverla (Hoverla: coll. J. Štorkán; Baum 1929) and two species from the field name Koz'meshchyk (Kozmeščuk: coll. J. Štorkán; Baum 1930, 1934). A little more information about spiders of Chornohora was included in the publications of Hungarian scientists: G. Kolosvary recorded one species from Mt. Petros (Kolosváry 1937), and 41 species were listed by J. Balogh and I. Loksa (Balogh 1940, Balogh & Loksa 1947a, 1947b).

From the 1950's onwards the araneological study was carried out by M. Legotai in the Zakarpats'ka Oblast. Information on distribution of 36 species of spiders in the Chornohora massif (Hoverla Mt., meadows Gropa and Menchul Kvasivs'kyi, field name Koz'meshchyk) was presented in her PhD work "The Spiders of the Ukrainian Carpathians" (Legotay 1974), and in several papers (Legotay & Tarasyuk 1964, Legotay 1958, 1959, 1973, 1989), most of which, unfortunately, did not specify collecting localities.

In 1979, some arachnological material was collected by A. Zyuzin in the Ukrainian Carpathians (within the Chornohora massif, mountains Hoverla and Petros, the Menchul Kvasivs'kyi meadow, field name Ozirnyi). Results of this study were included in his PhD thesis devoted to the wolf spiders of the genus *Pardosa* in the fauna of the European part of the USSR (Zyuzin 1981).

In 1999, S. Ovtchinnikov described a new subspecies of spiders from the Carpathians, including the Chornohora massif, *Coelotes pickardi carpathensis* Ovtchinnikov 1999 (Ovtchinnikov 1999), based on specimens collected by Y. Marusik and A. Zyuzin.

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In 1999-2006, numerous invertebrate specimens were collected by V. Chumak, V. Tymochko and V. Martynov from the territory of the Carpathian National Park and Carpathian Biosphere Reserve. Arachnological material (64 species of spiders from the Chornohora) was analyzed by E. Prokopenko; some of the spiders belonging to the family Linyphiidae were determined by V. Gnelitsa (Prokopenko & Chumak 2007). A study of spider communities in the subalpine green alder and pine scrubs (Chumak et al. 2007) deserves special attention, as the first comprehensive ecological account of spiders from the Chornohora Mts.

In total, 173 spider species have been reported from the Chornohora Mts, except for the collection by W. Kulczyński which will be the subject of a separate study. Therefore, in terms of the spider fauna the Chornohora seems to be one of the best investigated areas of the Carpathians. Although the aforementioned studies have been conducted since 1867, they were highly fragmented: most of the species remain known from one or two (rarely five or six) localities. The purpose of the present work is to summarize and complement the existing araneological data for the Chornohora Mts. Approximately 60 % of the Chornohora massif is a protected area, in particular, the territory of the Carpathian National Park and Carpathian Biosphere Reserve. Consequently, the present work will hopefully provide an effective data set that could characterize the status of the investigated habitat types and could also be used in the framework for nature conservation, ecological planning and management.

The Chornohora massif is located in the eastern part of the Ukrainian Carpathians, in the Polonyns'ki Beskydy area, on the verge of Ivano-Frankivs'k and Transcarpathian regions. The territory of the mountain massif is bordered by river valleys. The Chornohora is delimited: to the west by the Chorna Tysa River; to the north by the Lazeshchyna and Yablunytsia Rivers; to the north-east by the Prut River and its tributary, the Ardzheliuzha River, through the Vorokhta mountain pass to the Il'tsia River; to the east by the Chornyi Cheremosh River; and to the south by the Shybenyi and the Bila Tisa Rivers. The total area of the Chornohora is approximately 900 km^2 (Nesteruk 2003). According to the divisions adopted by the framework of Convention on the Protection and Sustainable Development of the Carpathians, the Chornohora is part of the two orographical units: Vysoki Polonyny Chornohory and Vorochtians'ka Verchovyna.

The Chornohora is the highest mountain group of the Ukrainian Carpathians. Its main range extends for about 40 km. The western part of the massif contains Mt. Petros (2020 m), from which extends a group of the lower mountains. The eastern section is a monotonous range with 11 summits over 1800 m (the highest peak is Hoverla – 2061 m), at a minimum elevation of 1750 m above sea level (Nesteruk 2003; Fig. 1.).

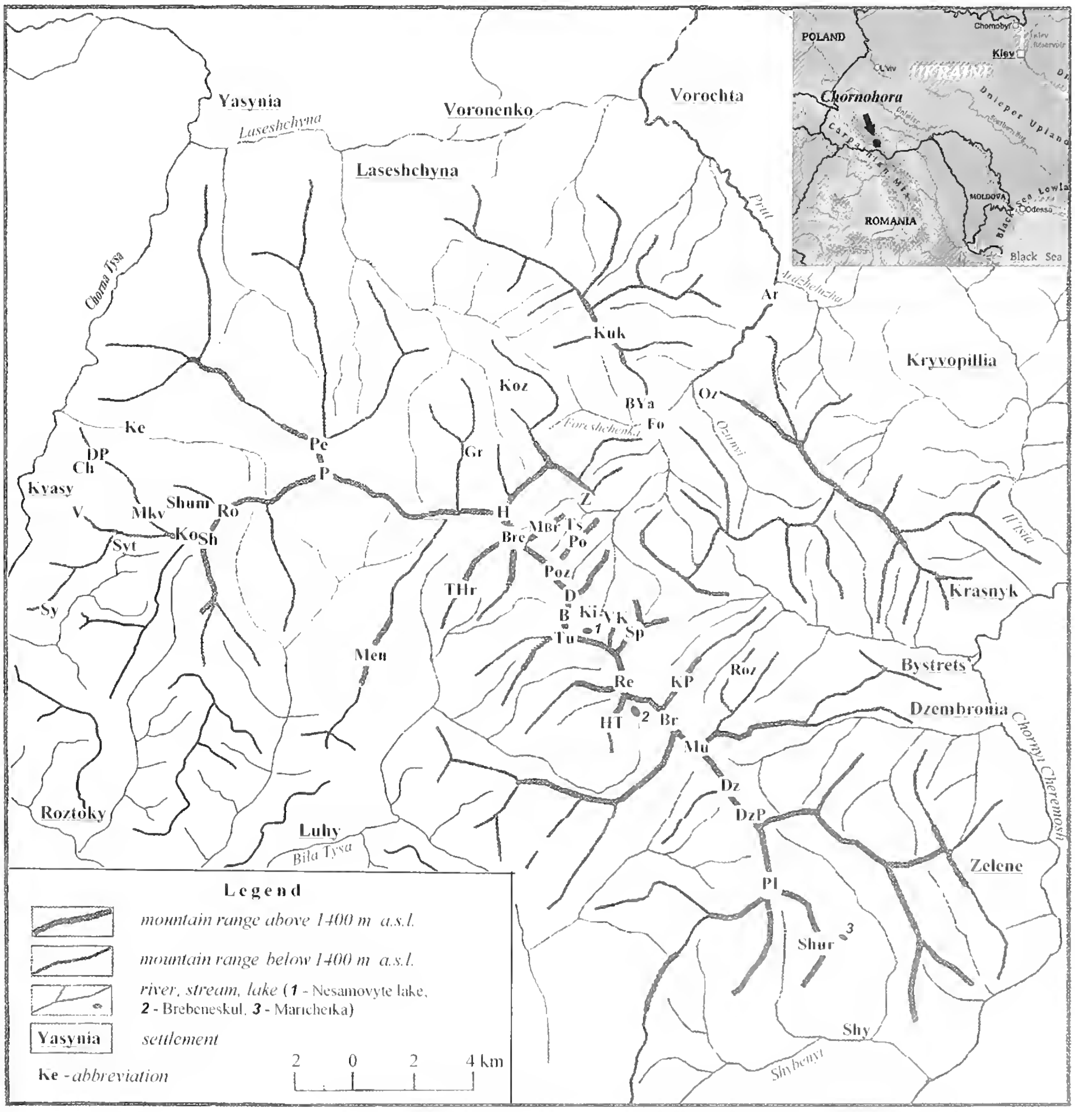

Fig. 1: The Chornohora massif. Schematic map of collection locations (Abbreviated names are given in the Material and methods and in Tab. 1)

According to the climatic zonation of the Ukrainian Carpathians, the Chornohora massif is situated within the cold and cold-cool temperate zones. Duration of the summer period varies from 1 to 2.5 months at the lower montane zone; above 1000 m a meteorological summer is usually not observed (the mean daily temperature on the mountain summits is approximately +7 °C in July). The summer is characterized by considerable diurnal variations of temperature. Winter is the longest season, lasting 3-5 months at the lower montane zone, and 5-6 months in the upper montane, subalpine and alpine zones. The average winter temperatures in the Chornohora massif are between -3 and -6 °C. In winter months the frozen soil layer slowly reaches 60-80 cm. The maximum snow depth is 5 m; snow melts from April to May and June. Snow fields, which are formed by direct snowfall, avalanches and wind drift in the glacial cirques (often 10m deep) in cold years, may not melt before the next winter. Annual rain precipitation ranges from 500 to 1500 mm or more, 75 % of which may fall in rainstorms. The greatest rainfall is in the months of June and the first half of July (Stojko et al. 1982).

The Chornohora massif has four vegetation zones. In the lower montane zone (600 m to 1100/1200 m), usually beech (Fageta sylvaticae), fir-beech (Abieto-Fageta) and beech-fir-spruce (Fageto-Abieto-Piceeta) forests occur. Also common are secondary meadows. The upper montane zone (1100/1200 m to 1600/1650 m) in the western part of the massif most commonly has beech forests (Fageta sylvaticae), mountain hay meadows and pastoral ecosystems. In the eastern part, the spruce (Piceeta abietis) and fir-spruce (Abieto-Piceeta) forests dominate. The subalpine zone (1600/1650 m to 1800/1850 m) is represented by treeline ecotones, green alder and pine scrubs, secondary *Vaccinium* heaths and *Juniperus* thickets, subalpine tall grass communities and *Nardus stricta* swards. The alpine zone (1800/1850 m to 2061 m) is dominated by alpine heaths, alpigenous grasslands and moss and lichen communities. Large areas of the summits of the mountain ranges are covered with screes, consisting of fragments of rocks that have accumulated on the tops of mountains or on the slopes (Koziy 1972, Stojko 1993).

Orographic and climatic factors have a significant influence on the fauna formation of the Chornohora massif. The presence of four vegetation zones provides a considerable species diversity of invertebrates. In the alpine and subalpine zones, specific biotic conditions form the habitats of rare and endemic Carpathian mountain species of spiders.

Material and methods

The present checklist of 252 spider species for the Chornohora massif is based both on previously published data and on collections by the authors (1999, 2006, 2011-2014). Also included are data from the spider collections of the Museum of Natural History, Wroclaw University, in particular from 1933-1938, collected by Stanisław Pilawski (MPUWr, coll. et det. S. Pilawski). In addition, some unidentified and unpublished specimens from spider collections in the Museum and Institute of Zoology Polish Academy of Sciences, Warsaw are included (MiIZ; the former collection of W. Kulczyński). Three species (*Micrargus* sp. *Taranucnus* sp. and *Formiphantes* sp.) are most likely new to science, and work on their descriptions is ongoing.

The study was conducted on the basis of standard collecting methods, such as Barber pitfall traps, entomological sweep-netting, hand-collecting and with the aid of pooter. Collecting was undertaken indifferent vegetation layers. Nomenclature follows the World Spider Catalog (2015).

Most field studies were conducted in the upper montane forest, subalpine and alpine zones on the slopes of the main ridge, adjacent spurs and mountains. The studied area covers the following mountains (with their appropriate abbreviations): Bezimenna (B), Brebeneskul (Br), Breskul (Bre), Dancer (D), Dzembronia (Dz), Hoverla (H), Hutyn Tomnatyk (HT), Kopytsia (Ko), Malyi Breskul (MB), Munchel (Mu), Petros (P), Petrosul (Pe), Pip Ivan (PI), Pozhyzhevs'ka (Poz), Rebra (R), Rogneska (Ro), Sheshul (Sh), Shuryn (Shur), Turkul (Tu), Velyki Kizly (VK) and the spur Kedruvatyi Pohorilets' (KP); the meadows: Dzhordzheva pryluka (DP), Menchul Kvasivs'kyi (MKv), Pozhyzhevs'ka (Po), Vesnarka (V), Sytnyi (Sy), Chertizh (Che); some field names: Shumneska (Shu), Sytnyi (Syt); the field names in the glacial cirques: Kizly (Ki), Shumneska (Shum), Tsybul'nyk (Ts); and the valleys of large mountain streams and rivers: Chorna Tysa (Tisza), Keveliv, Prut, Shybenyi. Some material studied was collected from the villages of Kvasy and Shybenyi (Fig. 1, Tab. 1).

There are some locality names cited in the literature and in the museum collections, but absent from our material, in particular: the field names Ardzheluzha (Ar), Foreshchanka (Fo), Koz'meshchyk (Koz), Ozirnyi (Oz), and Tovstyi Hrun' (THr), the meadow Gropa (Gr), the mountain ranges Kukul (Kuk) and Rozshybenyk (Roz), mountains Menchyl (Me), Spytsi (Sp), along with the villages Luhy and Voronenko; all these are illustrated in Fig. 1.

Abbreviations used in the text are as follows: Mt. – mountain, m. – meadow, f.n. – field name, riv. – river, LNU – Ivan Franko National University of L'viv, IEC – Institute of Ecology of the Carpathians; coll. H. – material was collected and identified by A. Hirna, coll. Gn. – by V. Gnelitsa, coll. Zh. – by E. Zhukovets.

Some species records remain unconfirmed as they are absent from modern spider collections. Data from this research have significantly complemented the information about the regional spider fauna at species, genus and family levels, and covered a significantly broader area of the Chornohora Mts. as compared with the earlier data. The annotated list presented below does not, however, provide a full faunistic list of the spiders from this territory; it only reflects the current state of faunistic knowledge to be further complemented by subsequent research.

In two earlier publications (Prokopenko & Chumak 2007, Chumak et al. 2007), the location of the study areas with their proximity to village settlements was incorrect. The data have been clarified in the authors' publications, and correspond to the numbers listed in these papers: [3] - the village Luhy, [4] – field name Tovstyi Hrun', [6] – Mt. Menchyl', [17] – pine and green alder scrubs on Mt. Pozhyzhevs'ka, and [18] – the meadow Pozhyzhevs'ka.

The description of known localities for each species is divided in the annotated list into three parts: – (1) the known 'published data' from the Chornohora massif, (2) the unpublished data known from museum 'collections', and (3) the 'material' collected by the authors in 1999, 2006 and 2011-2014. All locality names for the material collected by the authors are listed in alphabetical order (Tab. 1).

Tab. 1: Collection localities [Abbreviation - m above sea level]

Locality	Coordinates	Locality	Coordinates
Babyna Yama f.n. [BYa-942]	48°11'24.6"N, 24°34'11.3"E	Malyi Breskul Mt. [MB-1337]	48°09'38.3"N, 24°32'3.7"E
Bezimenna Mt. [B-1347]	48°08'34.6"N, 24°32'56.2"E	[MB-1339]	48°09'39.5"N, 24°32'2.6"E
[B-1369]	48°08'38.06"N, 24°32'53.19"E	[MB-1379]	48°09'28.5"N, 24°31'46.1"E
[B-1370]	48°08'36.11"N, 24°32'52.31"E	[MB-1405]	48°09'22.76"N, 24°31'32.27"E
[B-1371]	48°08'34.34"N, 24°32'51.36"E	[MB-1635]	48°09'00"N, 24°31'15"E
[B-1372]	48°08'38.58"N, 24°32'53.38"E	Menchul Kvasivs'kyi m. [MKv-1191]	48°09'22"N, 24°20'13"E
[B-1373]	48°08'33.83"N, 24°32'51.02"E	[MKv-1205]	48°09'23"N, 24°20'15"E
[B-1375]	48°08'32.2"N, 24°32'53.3"E	[MKv-1216]	48°09'20"N, 24°20'19"E
[B-1400]	48°08'23.8"N, 24°32'55.4"E	[MKv-1240]	48°09'27"N, 24°20'23"E
[B-1416]	48°08'17.9"N, 24°32'55.5"E	Munchel Mt.[Mu-1943]	48°05'23.2"N, 24°35'35.3"E
[B-1441]	48°08'30.1"N, 24°32'51.8"E	[Mu-1974]	48°05'27"N, 24°35'44"E
Brebeneskul Mt. [Br-1900]	48°05'27.5"N, 24°35'3.6"E	[Mu-1988]	48°05'25.7"N, 24°35'42.4"E
[Br-1982]	48°05'57"N, 24°34'48"E	[Mu-1991]	48°05'25.9"N, 24°35'43.9"E
[Br-2018]	48°05'52.7"N, 24°34'46.9"E	[Mu-1992]	48°05'27.1"N 24°35'44.6"E
[Br-2027]	48°05'51.6"N, 24°34'46.7"E	Petros Mt. [P-1812]	48°09'60"N, 24°24'36"E
[Br-2030]	48°05'53.9"N, 24°34'49.5"E	[P-1977]	48°10'18"N, 24°25'22"E
[Br-2035]	48°05'51.6"N, 24°34'47.9"E	[P-1981]	48°10'17"N, 24°25'11"E
Breskul Mt. [Bre-1594]	48°08'59.8"N, 24°31'17.6"E	[P-1996]	48°10'17"N, 24°25'14"E
[Bre-1709]	48°08'54.5"N, 24°31'8.6"E	Petrosul Mt. [Pe-1810]	48°10'41"N, 24°25'08"E
[Bre-1710]	48°08'55.34"N, 24°31'8.41"E	Pip Ivan Mt. [PI-1681]	48°02'26"N, 24°36'32"E
[Bre-1711]	48°08'54.5"N, 24°31'8.6"E	[PI-1985]	48°02'48"N, 24°37'34"E
[Bre-1875]	48°08'58.2"N, 24°30'48.9"E	[PI-1995]	48°02'48"N, 24°37'40"E
[Bre-1899]	48°09'1.3"N, 24°30'41.5"E	Pozhyzhevs'ka m. [Po-1372]	48°09'26"N, 24°32'17"E
[Bre-1900]	48°09'01.4"N, 24°30'40.3"E	[Po-1390]	48°09'16"N, 24°32'13"E
Chertizh m. [Che-999]	48°10'23"N, 24°18'31"E	[Po-1406]	48°09'21"N, 24°32'08"E
Dancer Mt. [D-1366]	48°08'53"N, 24°32'37"E	[Po-1420]	48°09'18.1"N, 24°32'3.5"E
[D-1650]	48°08'22"N, 24°31'50"E	[Po-1427]	48°09'16"N, 24°32'06"E
Dzembronia Mt. [Dz-1836]	48°04'26"N, 24°36'32"E	[Po-1533]	48°09'02"N, 24°31'27"E
[Dz-1841]	48°04'08"N, 24°36'51"E	Pozhyzhevs'ka Mt. [Poz-1358]	48°09'35"N, 24°32'29"E
Dzhordzheva Pryluka m. [DP-1023]	48°10'27"N, 24°18'34"E	[Poz-1449]	48°09'11.65"N, 24°32'01.02"E,
Hoverla Mt. [H-1283]	48°09'55.9"N, 24°31'6.5"E	[Poz-1521]	48°09'05"N, 24°31'41"E
[H-1311]	48°10'0.12"N, 24°31'53.84"E	[Poz-1747]	48°08'47.5"N, 24°31'14.8"E
[H-1327]	48°09'56"N, 24°31'57"E	[Poz-1803]	48°08'39"N, 24°31'25"E
[H-1357]	48°09'56.6"N, 24°31'37.9"E	Rebra Mt. [R-1907]	48°06'53.9"N, 24°33'19"E
[H-1388]	48°10'2.06"N, 24°31'34.80"E	[R-1941]	48°06'45.1"N, 24°33'21.7"E
[H-1393]	48°10'1.9"N, 24°31'32.8"E	[R-1954]	48°06'49.6"N, 24°33'24.9"E
[H-1398]	48°10'2.5"N 24°31'33.4"E	[R-1988]	48°06'46"N, 24°33'30.8"E
[H-1502]	48°09'57.43"N, 24°31'09.24"E	Rogneska Mt. [Ro-1398]	48°09'41"N, 24°21'46"E
[H-1607]	48°09'50.74"N, 24°30'49.77"E	[Ro-1638]	48°09'26"N, 24°22'26"E
[H-1630]	48°09'08"N, 24°29'22"E	[Ro-1640]	48°09'27"N, 24°22'27"E
Hutyn Tomnatyk Mt. [HT-1925]	48°06'00"N, 24°33'30"E	Sheshul Mt. [Sh-1367]	48°09'15"N, 24°20'39"E
[HT-2010]	48°05'59"N, 24°33'21.7"E	[Sh-1393]	48°09'29"N, 24°21'48"E
[HT-2011]	48°05'59.06"N, 24°33'24.8"E	[Sh-1487]	48°09'21"N, 24°21'58"E
[HT-2012]	48°05'58"N, 24°33'24.8"E	[Sh-1520]	48°09'08"N, 24°21'01"E
Kedruvatyi Pohorilets' mt. spur [KP-1980]	48°06'20"N, 24°34'31.1"E	[Sh-1542]	48°09'08"N, 24°21'06"E
		[Sh-1601]	48°08'55"N, 24°21'42"E
Keveliv f.n. [Ke-690]	48°11'09"N, 24°18'57"E	Shumneska f.n. [Shu-1205]	48°09'31"N, 24°20'54"E
Kizly f.n. [Ki-1539]	48°07'51"N, 24°32'42"E	Shumneska m. [Shum-1315]	48°09'34"N, 24°21'49"E
[Ki-1674]	48°07'52"N, 24°32'14"E	Shuryn Mt. [Shur-1477]	48°01'29"N, 24°39'35"E
[Ki-1740]	48°07'21.6"N, 24°32'21.4"E	[Shur-1521]	48°02'05"N, 24°39'27"E
Kopytsia Mt. [Ko-1050]	48°08'34"N, 24°19'53"E	Shybenyi vil. [Shy-876]	47°59'29"N, 24°41'43"E
[Ko-1230]	48°09'13"N, 24°20'24"E	[Shy-922]	48°00'06"N, 24°40'26"E
[Ko-1255]	48°09'04"N, 24°20'04"E	Sytnyi m. [Sy-890]	48°07'48"N, 24°17'24"E
[Ko-1370]	48°09'00"N, 24°20'40"E	[Sy-953]	48°07'44"N, 24°17'33"E
Kvasy vil. [Kv-545]	48°10'18"N, 24°17'07"E	[Sy-966]	48°07'53"N, 24°17'48"E
[Kv-699]	48°10'01"N, 24°17'31"E	[Sy-995]	48°08'04"N, 24°18'04"E
[Kv-745]	48°10'09"N, 24°17'35"E	Sytnyi f.n. [Syt-1208]	48°08'55"N, 24°19'28"E

Continuation Tab. 1

Locality	Coordinates
Tsybul'nyk f.n. [Ts-1382]	48°09'24.04"N, 24°31'39.56"E
[Ts-1378]	48°09'28.3"N, 24°31'46.1"E
[Ts-1384]	48°09'25.4"N, 24°31'41.6"E
[Ts-1386]	48°09'28.79"N, 24°31'46.74"E
[Ts-1375]	48°09'25"N, 24°31'48"E
[Ts-1385]	48°09'25.85"N, 24°31'41.26"E
[Ts-1381]	48°09'22.9"N, 24°31'37.1"E
[Ts-1373]	48°09'28.3"N, 24°31'48.4"E
[Ts-1374]	48°09'27.6"N, 24°31'48.3"E,
[Ts-1364]	48°09'28"N, 24°31'47.9"E
Turkul Mt. [Tu-1710]	48°07'28.88"N, 24°32'08.99"E
[Tu-1800]	48°07'21"N, 24°32'03"E
Velyki Kizly Mt. [VK-1871]	48°07'22.8"N, 24°32'52.5"E
Vesnarka m. [V-891]	48°08'56"N, 24°18'14"E
[V-991]	48°09'01"N, 24°18'24"E
[V-1079]	48°09'00"N, 24°18'50"E
Zarosliak f.n. [Z-1260]	48°09'45"N, 24°32'19"E

Checklist

Agelenidae C. L. Koch, 1837

***Agelena labyrinthica* (Clerck, 1757)**

Material. Menchul Kvasivs'kyi m. [MKv-1191], mountain hay meadows, in grass, 9.VII.1999, 1♀; Sytnyi m. [Sy-995], same habitat, 10.VII.2012, 1♀; Vesnarka m. [V-891], same habitat, 11.VII.2012, 2♀♀, coll. H. [V-991], same habitat, 1.VII.1999, 1♂, coll. H.

***Allagelena gracilens* (C. L. Koch, 1841)**

Material. Sheshul Mt. [Sh-1520], subalpine green alder scrubs, on bush branches, 14.VIII.2014, 1♀, coll. H.

***Coelotes atropos* (Walckenaer, 1830)**

Published data. Hoverla Mt. (Chyzer & Kulczyński 1897).
Material. Sytnyi f.n. [Syt-1208], old-growth beech forest, on the forest floor, 13.VII.2013, 2♂♂, coll. H.

***Coelotes pickardi carpathensis* Ovtchinnikov 1999**

Published data. Hoverla Mt. (Baum 1929: *Amaurobius erberi* [misidentified], Ovtchinnikov 1999: *C. pastor carpathensis*). Menchyl' Mt. (Prokopenko & Chumak 2007: *C. pastor carpathensis*). Menchul Kvasivs'kyi m. (Ovtchinnikov 1999: *C. pastor carpathensis*). Pozhyzhevs'ka Mt.; Pozhyzhevs'ka m. (Prokopenko & Chumak 2007: *C. pastor carpathensis*).
Material. Dancer Mt. [D-1366], spruce forest, in herpetobium, 23.VII.2014, 4♂♂, 6.IX.2014, 4♂♂; Hutyn Tomnatyk Mt. [HT-1925], alpine wet rock grooves with tall grass (*Festuca*) communities, in herpetobium, 9♂♂, 1♀, VI-VII.2012, coll. H. Malyi Breskul Mt. [MB-1339], old-growth spruce forest, between sedges, 11.VIII.2012, 1♂, coll. Zh. Petros Mt. [P-1981], siliceous screes of the alpine level, under stones, 20.VI.2013, 2♂♂; Petrosul Mt. [Pe-1810], alpigenous acidophilous grassland, (*Juncus trifidus*) communities, between stones, 20.VI.2013, 1♂; Pozhyzhevs'ka m. [Po-1533], subalpine tall grass communities, in herpetobium, 26.VII.2014, 3♂♂; Pozhyzhevs'ka Mt. [Poz-1358], spruce forest, in herpetobium, 23.VII.2014, 1♂, 6.IX.2014, 5♂♂; [Poz-1521], green alder scrubs, in herpetobium, 26.VII.2014, 1♂, coll. H.

***Coelotes terrestris* (Wider, 1834)**

Published data. Hoverla Mt. (Balogh 1940). Luhy vil.; Menchyl' Mt.; Pozhyzhevs'ka m. (Prokopenko & Chumak 2007). Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Dancer Mt. [D-1366], spruce forest, in herpetobium, 23.VII.2014, 3♂♂, 6.IX.2014, 15♂♂; Kopytsia Mt. [Ko-1370], (*Vaccinium*) heaths, in dead grass remains, 10.VII.2012, 11♂♂, coll. H. Malyi Breskul Mt. [MB-1337], old-growth spruce forest, under tree bark, 11.VIII.2012, 1♀; Munchel Mt. [Mu-1991], the summit, under stones, 10.VIII.2012, 2♀♀, coll. Zh. Petros Mt. [P-1996], siliceous screes of the alpine level, under stones, 20.VI.2013, 2♂♂; Pozhyzhevs'ka m. [Po-1533], subalpine tall grass communities, in herpetobium, 6.IX.2014, 10♂♂, 2♀♀; Pozhyzhevs'ka Mt. [Poz-1358], spruce forest, in herpetobium, 23.VII.2014, 2♂♂, 1♀, 6.IX.2014, same habitat, 15♂♂; [Poz-1521], green alder scrubs, in herpetobium, 26.VII.2014, 3♂♂; Rogneska Mt. [Ro-1638], subalpine (*Juniperus*) thickets, under juniper branches, 26.VI.2012, 1♀; Shumneska m. [Shum-1315], bank of the riv. Shumneska, under stones, 9.VII.2012, 1♀; Sytnyi f.n. [Syt-1208], old-growth beech forest, on the forest floor, 13.VII.2013, 4♂♂; Tsybul'nyk f.n. [Ts-1375], an area with (*Pinus mugo*) scrub, in herpetobium, 6.IX.2014, 7♂♂, coll. H.

***Eratigena atrica* (C. L. Koch, 1843)**

Material. Sytnyi m. [Sy-890], mountain hay meadows, on the foundations of a house, 30.VI.1999, 1♀, coll. H.

***Histopona torpida* (C. L. Koch, 1837)**

Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007).
Material. Chertizh f.n. [Che-999], beech forest edge, on the forest floor, 16.VII.2013, 1♀, coll. H.

***Inermocoelotes inermis* (L. Koch, 1855)**

Published data. Hoverla Mt. (Legotay 1974: *Coelotes i.*). Menchyl' Mt.; Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007: *Eurocoelotes i.*).
Material. Kopytsia Mt. [Ko-1370], (*Vaccinium*) heaths, in moss, 10.VII.2012, 1♂, coll. H.

Amaurobiidae Thorell, 1870

***Amaurobius fenestralis* (Ström, 1768)**

Published data. Hoverla Mt. (Balogh 1940).

***Amaurobius ferox* (Walckenaer, 1830)**

Published data. Hoverla Mt. (Baum 1929).

***Amaurobius similis* (Blackwall, 1861)**

Published data. Menchyl' Mt. (Prokopenko & Chumak 2007).

***Callobius claustrarius* (Hahn, 1833)**

Published data. Gropa m. (Legotay 1974: *Amaurobius c.*). Menchyl' Mt. (Prokopenko & Chumak 2007). Petros Mt. (Chyzer & Kulczyński 1891: *Amaurobius c.*). Pozhyzhevs'ka m. (Prokopenko & Chumak 2007). Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Sytnyi f.n. [Syt-1208], primary beech forest, on the forest floor, 13.VII.2013, 3♂♂, coll. H.

Anyphaenidae Bertkau, 1878
***Anyphaena accentuata* (Walckenaer, 1802)**
Published data. Menchyl' Mt. (Prokopenko & Chumak 2007).
Material. Keveliv f.n. [Ke-690], bank of the riv. Keveliv, on the riparian plants, 22.VI.2012, 1♀, coll. H.

Araneidae Clerck, 1757
***Aculepeira ceropegia* (Walckenaer, 1802)**
Published data. Hoverla m. (Legotay 1974: *Araneus c.*). Koz'meshchyk f.n. (Baum, 1930: *Aranea c.*); Pozhyzhevs'ka m. (Prokopenko & Chumak 2007).
Material. Bezimenna Mt. [B-1375], spruce forest glade, on the branches of raspberry bushes, 8.VIII.2012, 1♀, coll. Zh. Dzhordzheva pryluka m. [DP-1023], mountain hay meadows, in grass, 16.VII.2013, 1♀; Sytnyi m. [Sy-966], same habitat, 21.VI.2012, 3♂♂, 3♀♀, 8.VII.2014, same habitat, 1♂, 2♀♀; [Sy-995], same habitat, 10.VII.2012, 1♂; Vesnarka m. [V-1079], same habitat, 28.VI.2012, 2♂♂, 1♀, coll. H.

***Araneus alsine* (Walckenaer, 1802)**
Collections. Foreshchanka f.n. [labelled: Foreszczenka], 13.VIII.1935, 2♀♀ (MPUWr, coll. et det. S. Pilawski).
Material. Keveliv f.n. [Ke-690], bank of the riv. Keveliv, on the riparian plants, 5.VII.1999, 1♂; Menchul Kvasivs'kyi m. [MKv-1191], mountain hay meadows, 15.VII.2013, 1♀; Sheshul Mt. [Sh-1520], subalpine green alder scrubs, on bush branches, 14.VIII.2014, 1♀, coll. H.

***Araneus diadematus* Clerck, 1757**
Published data. Petros Mt. (Chyzer & Kulczyński 1891: *Epeira d.*). Tovstyi Hrun' f.n. (Prokopenko & Chumak 2007).
Material. Shuryn Mt. (f.n. Vesnarka) [Shur-1477], mountain hay meadows, in grass, 8.IX.2014, 1♀; Shybenyi vil. [Shy-876], the roadside, on the dead wood, 8.IX.2014, 1♀; Vesnarka m. [V-991], mountain hay meadows, in grass, 1.VII.1999, 1♀, coll. H.

***Araneus marmoreus* Clerck, 1757**
Published data. Hoverla Mt. (Balogh 1940). Petros Mt. (Chyzer & Kulczyński 1891: *Epeira m.* forma *principalis* Thorell, 1858 and *Epeira m.* forma *pyramidata* (Clerck, 1757)).
Material. Sheshul Mt. [Sh-1520], green alder scrubs, on bush branches, 14.VIII.2014, 1♀, coll. H.

***Araneus nordmanni* (Thorell, 1870)**
Published data. Hoverla Mt. (Balogh 1940).
Collections. Zarosliak f.n. [labelled: Zaroślak], 25.VIII.1934, 4♀♀ (MPUWr, coll. et det. S. Pilawski).

***Araneus quadratus* Clerck, 1757**
Material. Pozhyzhevs'ka m. [Po-1420], (*Juniperus*) thickets, on juniper branches, 13.VIII.2012, 1♀, coll. Zh.

***Araneus sturmi* (Hahn, 1831)**
Collections. The Chornohora massif [labelled: Czarnogóra], 22.VIII.1934, 5♀♀ (MPUWr, coll. et det. S. Pilawski).
Material. Sytnyi m. [Sy-995], mountain hay meadows, in grass, 10.VII.2012, 1♀, coll. H. Tsybul'nyk f.n. [Ts-1374], an area with (*Pinus mugo*) scrubs, on bush branches, 11.VIII.2012, 1♀, coll. Zh.

***Araniella alpica* (L. Koch, 1869)**
Published data. Hoverla Mt. (Balogh 1940: *Araneus a.*, Legotay 1974: *Araneus a.*). Petros Mt. (Chyzer & Kulczyński 1891: *Epeira a.*).
Material. Dzhordzheva pryluka m. [DP-1023], mountain hay meadows, in grass, 4.VII.2012, 2♀♀; Keveliv f.n. [Ke-690], bank of the riv. Keveliv, on the riparian plants, 22.VI.2012, 1♀; Sheshul Mt. [Sh-1487], green alder scrubs, on bush branches, 2.VII.1999, 1♀; Shumneska m. [Shum-1315], bank of the riv. Shumneska, on spruce, 9.VII.2012, 1♂; [Shu-1205], beech forest, on the forest floor, 9.VII.2012, 1♂; Sytnyi m. [Sy-953], mountain hay meadows, in grass, 30.VI.1999, 1♂, 1♀; Vesnarka m. [V-991], same habitat, 1.VII.1999, 1♀, coll. H.

***Araniella cucurbitina* (Clerck, 1757)**
Published data. The Chornohora massif [Czarnogóra] (Wajgiel 1874: *Epeira c.* CK.). Petros Mt. (Chyzer & Kulczyński 1891: *Epeira c.*). Pozhyzhevs'ka m. (Prokopenko & Chumak 2007).
Material. Dzhordzheva pryluka m. [DP-1023], mountain hay meadows, in grass, 4.VII.2012, 1♀; Sheshul Mt. [Sh-1487], green alder scrubs, on bush branches, 2.VII.1999, 1♀; Sytnyi m. [Sy-966], mountain hay meadows, in grass, 21.VI.2012, 1♂; [Sy-953], same habitat, 30.VI.1999, 1♀; Vesnarka m. [V-991], same habitat, 1.VII.1999, 1♂, coll. H.

***Araniella displicata* (Hentz, 1847)**
Published data. Menchul Kvasivs'kyi m. (Legotay 1974: *Araneus cucurbitinus d.*).

***Argiope bruennichi* (Scopoli, 1772)**
Material. Vesnarka m. [V-991], mountain hay meadows, on tall grasses, 1.VII.1999, 1♀, coll. H.

***Cyclosa conica* (Pallas, 1772)**
Published data. The Chornohora massif [Czarnogóra] (Wajgiel 1874: *Singa c.* Walck.). Hoverla Mt. (Balogh 1940). Menchyl' Mt.; Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007).
Material. Menchul Kvasivs'kyi m. [MKv-1216], upper limit beech forests, on trees branches, 3.VII.1999, 1♀; Shumneska m. [Shum-1315], bank of the riv. Shumneska, on spruce, 9.VII.2012, 1♀; Sytnyi m. [Sy-953], mountain hay meadows, in grass, 30.VI.1999, 1♀, coll. H.

***Gibbaranea bituberculata* (Walckenaer, 1802)**
Published data. Gropa m. (Legotay 1974: *Araneus b.*).

***Gibbaranea gibbosa* (Walckenaer, 1802)**
Published data. Hoverla Mt. (Legotay 1974: *Araneus g.*).

Hypsosinga sanguinea (C. L. Koch, 1844)
Material. Sytnyi m. [Sy-966], mountain hay meadows, in grass, 21.VI.2012, 1♀, coll. H.

***Larinioides cornutus* (Clerck, 1757)**
Published data. Petros Mt. (Chyzer & Kulczyński 1891: *Epeira c.*).

***Larinioides ixobolus* (Thorell, 1873)**
Published data. Koz'meshchyk f.n. (Baum, 1934: *Aranea i.*).

Larinioides patagiatus (Clerck, 1757)
Published data. Hoverla Mt. (Legotay 1974: *Araneus ocellatus* Cl., 1757). Petros Mt. (Chyzer & Kulczyński 1891: *Epeira p.*).
Material. Kvasy vil. [Kv-545], bank of the riv. Chorna Tysa, on the riparian plants, 22.VI.2012, 1♀; Malyi Breskul Mt. [MB-1635], siliceous screes of the subalpine level, on young spruce, 23.VII.2014, 1♀; Shumneska m. [Shum-1315], bank of the riv. Shumneska, on spruce, 9.VII.2012, 1♀, coll. H.

Mangora acalypha **(Walckenaer, 1802)**
Collections. Zarosliak f.n. [labelled: Zaroślak], 12.VIII.1935, 2♀♀ (MPUWr, coll. et det. S. Pilawski).
Material. Kvasy vil. [Kv-545], bank of the riv. Chorna Tysa, on the riparian plants, 22.VI.2012, 1♀, coll. H.

Parazygiella montana (C. L. Koch, 1834)
Published data. Menchyl' Mt. (Prokopenko & Chumak 2007). Petros Mt. (Chyzer & Kulczyński 1891: *Zilla m.*).
Collections. Zarosliak f.n. [labelled: Zaroślak], 23.VIII.1934, 2♂♂, 2♀♀ (MPUWr, coll. et det. S. Pilawski: *Zygiella m.*).
Material. Kizly f.n. [Ki-1539], subalpine (*Pinus mugo*) scrubs, on bush branches, 24.VII.2014, 1♀; Menchul Kvasivs'kyi m. [MKv-1205], LNU field station, on outside walls, 15.VII.2013, 1♀; Pozhyzhevs'ka m. [Po-1427], IEC field station, on outside walls, 1♀, 21.VII.2014, coll. H.

Zilla diodia **(Walckenaer, 1802)**
Published data. Menchyl' Mt. (Prokopenko & Chumak 2007).

Zygiella atrica **(C. L. Koch, 1845)**
Published data. The Chornohora massif [Czarno-góra] (Wajgiel 1868, 1874: *Zilla a.*).

Clubionidae Wagner, 1887
Clubiona alpicola **Kulczyński, 1882**
Published data. Petros Mt. (Chyzer & Kulczyński 1897).
Material. Brebeneskul Mt. [Br-1982], siliceous screes, under stones, 24.VII.2014, 2♀♀, coll. H. [Br-2030], alpigenous acidophilous grassland, (*Festuca*) communities, in Icelandic moss, 9.VIII.2012, 1♀; [Br-2035], the summit, under stones, 9.VIII.2012, 6♀♀; Breskul Mt. [Bre-1875], alpigenous acidophilous grassland, under stones, 7.VIII.2012, 1♀, coll. Zh. Dancer Mt. (f.n. Orendarchyk) [D-1650], tall grass communities, bank of a mountain stream, under stones, 21.VII.2014, 2♀♀; Dzembronia Mt. (f.n. Pohane Misce) [Dz-1841], alpenrose heaths (*Rhododendron myrtifolium*), under stones, 7.IX.2014, 3♂♂, 2♀♀, coll. H. Kedruvatyi Pohorilets' mt. spur [KP-1980], alpigenous acidophilous grassland, (*Festuca*) communities, in dead grass remains, 9.VIII.2012, 1♀, coll. Zh. Munchel Mt. [Mu-1974], siliceous screes of the alpine level, under stones, 24.VII.2014, 1♀; Petros Mt. [P-1981], same habitat, VII.2011, 3♀♀; Pip Ivan Mt. [PI-1985], same habitat, 7.IX.2014, 1♀; [PI-1995], same habitat, 7.IX.2014, 1♀; Pozhyzhevs'ka Mt. [Poz-1803], same habitat, 24.VII.2014, 1♀, coll. H.

Clubiona diversa **O. P.-Cambridge, 1862**
Material. Sheshul Mt. [Sh-1367], (*Vaccinium*) heaths, between cowberry branches, 14.VIII.2014, 1♂, coll. H.

Clubiona frutetorum **L. Koch, 1867**
Material. Hutyn Tomnatyk Mt. [HT-1925], alpine wet rock grooves with tall grass (*Festuca*) communities, in herpetobium, VI-VII.2012, 3♂♂, 3♀♀, coll. H.

Clubiona lutescens **Westring, 1851**
Published data. Luhy vil. (Prokopenko & Chumak 2007).

Clubiona pallidula **(Clerck, 1757)**
Published data. Menchyl' Mt. (Prokopenko & Chumak 2007).

Clubiona reclusa **O. P.-Cambridge, 1863**
Published data. Pozhyzhevs'ka Mt.; Pozhyzhevs'ka m. (Prokopenko & Chumak 2007).
Material. Malyi Breskul Mt. [MB-1339], old-growth spruce forest, between sedges, 11.VIII.2012, 1♀, coll. Zh.

Clubiona subsultans **Thorell, 1875**
Published data. Menchyl' Mt. (Prokopenko & Chumak 2007).
Material. Hoverla Mt. [H-1283], spruce forest, under tree bark, 30.IX.2006, 1♀, [H-1357], same habitat, 11.VIII.2012, 1♀, coll. Zh.

Clubiona terrestris **Westring, 1851**
Material. Petros Mt. [P-1981], siliceous screes of the alpine level, under stones, 26.VI.2011, 1♀, coll. H.

Clubiona trivialis **C. L. Koch, 1843**
Material. Hoverla Mt. [H-1398], upper limit of spruce forest, on the lower branches of trees, 11.VIII.2012, 1♂, 1♀, coll. Zh. Kizly f.n. [Ki-1539], (*Pinus mugo*) scrubs, on bush branches, 24.VII.2014, 1♀, coll. H. Malyi Breskul Mt. [MB-1379], spruce forest edge, on the lower branches of trees, 11.VIII.2012, 2♂♂, 1♀, coll. Zh.

Cybaeidae Banks, 1892
Cybaeus angustiarum **L. Koch, 1868**
Published data. Hoverla Mt. (Balogh 1940). Luhy vil.; Menchyl' Mt. (Prokopenko & Chumak 2007). Petros Mt. (Herman, 1879: *C. tetricus* (C. K.) [misidentified], Kolosváry, 1937). Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Bezimenna Mt. [B-1400], spruce forest, in moss, and between stones, 10.VIII.2012, 1♀, coll. Zh. Dancer Mt. [D-1366], spruce forest, in herpetobium, 23.VII.2014, 3♂♂, 6.IX.2014, 2♂♂, 8♀♀; Kopytsia Mt. [Ko-1370], (*Vaccinium*) heaths, in moss, in dead grass remains, 10.VII.2012, 10♂♂; Petros Mt. [P-1981], siliceous screes, under stones, VII.2011, 1♂, 1♀; [P-1996], same habitat, 20.VI.2013, 2♂♂; Petrosul Mt. [Pe-1810], alpigenous acidophilous grassland, (*Juncus trifidus*) communities, between stones, 20.VI.2013, 1♂; Pip Ivan Mt. [PI-1681], subalpine (*Pinus mugo*) scrubs, in herpetobium, 7.IX.2014, 1♀; [PI-1995], siliceous screes, under stones, 7.IX.2014, 2♀♀; Pozhyzhevs'ka Mt. [Poz-1358], spruce forest, in herpetobium, 23.VII.2014, 10♂♂, 2♀♀, 6.IX.2014, same habitat, 6♂♂, 6♀♀; [Poz-1521], green alder scrubs, in herpetobium, 26.VII.2014, 15♂♂, 15♀♀, 6.IX.2014, same habitat, 10♂♂, 10♀♀; Pozhyzhevs'ka m. [Po-1533], subalpine tall grass communities, in herpetobium, 6.IX.2014, 1♀; Sheshul Mt.

[Sh-1542], subalpine (*Juniperus*) thickets, in herpetobium, 14.VIII.2014; 2♂♂, Sytnyi f.n. [Syt-1208], old-growth beech forest, on the forest floor, 13.VII.2013, 13♂♂; Tsybul'nyk f.n. [Ts-1375], an area with (*Pinus mugo*) scrub, in herpetobium, 26.VII.2014, 1♂, 1♀, 6.IX.2014, same habitat, 10♂♂, coll. H.

***Cybaeus* sp.**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).

Dictynidae O. P.-Cambridge, 1871
***Dictyna pusilla* Thorell, 1856**
Published data. Petros Mt. (Chyzer & Kulczyński 1891, 1918).

Eutichuridae Lehtinen, 1967
***Cheiracanthium erraticum* (Walckenaer, 1802)**
Material. Sytnyi m. [Sy-966], mountain hay meadows, in grass, 21.VI.2012, 1♂, coll. H.

Gnaphosidae Pocock, 1898
***Drassodes cupreus* (Blackwall, 1834)**
Material. Hutyn Tomnatyk Mt. [HT-1925], alpine wet rock grooves with tall grass (*Festuca*) communities, in herpetobium, VI-VII.2012, 1), coll. H.

***Drassodes lapidosus* (Walckenaer, 1802)**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).

***Drassodes pubescens* (Thorell, 1856)**
Material. Pozhyzhevs'ka Mt. [Poz-1358], spruce forest, in herpetobium, 23.VII.2014, 1), coll. H.

***Drassyllus pusillus* (C. L. Koch, 1833)**
Material. Pozhyzhevs'ka m. [Po-1533], subalpine tall grass communities, in herpetobium, 26.VII.2014, 3♂♂, coll. H.

***Gnaphosa badia* (L. Koch, 1866)**
Material. Dzembronia Mt. (f.n. Pohane Misce) [Dz-1841], alpenrose heath (*Rhododendron myrtifolium*), in Icelandic moss, 7.IX.2014, 1♀; Hutyn Tomnatyk Mt. [HT-1925], alpine wet rock grooves with tall grass (*Festuca*) communities, in herpetobium, VI-VII.2012, 3♂♂, 1♀; Petros Mt. [P-1996], siliceous screes of the alpine level, under stones, 20.VI.2013, 1♀; 20.VIII.2014, same habitat, 1♂; Rogneska Mt. [Ro-1640], subalpine (*Juniperus*) thickets, in Icelandic moss, 20.VI.2013, 3♀♀, coll. H.

***Haplodrassus signifer* (C. L. Koch, 1839)**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Hutyn Tomnatyk Mt. [HT-1925], alpine wet rock grooves with tall grass (*Festuca*) communities, in herpetobium, VI-VII.2012, 10♂♂, 15♀♀, coll. H. Munchel Mt. [Mu-1991], alpigenous acidophilous grassland, the summit, under stones, 10.VIII.2012, 1♀, coll. Zh. Petros Mt. [P-1996], siliceous screes, under stones, 20.VI.2013, 6♂♂; Petrosul Mt. [Pe-1810], alpigenous acidophilous grassland, (*Juncus trifidus*) communities, between stones, 20.VI.2013, 1♂; Pip Ivan Mt. [PI-1985], siliceous screes, under stones, 7.IX.2014, 1♀; [PI-1995], same habitat, 1♀; Sheshul Mt. [Sh-1542], subalpine (*Juniperus*) thickets, in herpetobium, 14.VIII.2014, 1♀; Shuryn Mt. (Maricheika) [Shur-1521], old-growth spruce forest, in moss, 8.IX.2014, 1♂; Sytnyi f.n. [Syt-1208], old-growth beech forest, on the forest floor, 13.VII.2013, 6♂♂, 20.VIII.2014, same habitat, 7♀♀, coll. H.

***Micaria pulicaria* (Sundevall, 1831)**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Pip Ivan Mt. [PI-1995], alpigenous acidophilous grassland, in Icelandic moss, 7.IX.2014, 1♂, coll. H.

***Zelotes clivicola* (L. Koch, 1870)**
Published data. Pozhyzhevs'ka m.; Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).

***Zelotes latreillei* (Simon, 1878)**
Published data. Hoverla Mt. (Balogh 1940).

***Zelotes subterraneus* (C. L. Koch, 1833)**
Published data. Hoverla Mt. (Balogh 1940). Menchyl' Mt. (Prokopenko & Chumak 2007) Pozhyzhevs'ka Mt. (Chumak et al. 2007).
Material. Pozhyzhevs'ka Mt. [Poz-1803], siliceous screes of the alpine level, under stones, 24.VII.2014, 1♀; Sytnyi m. [Sy-953], mountain hay meadows, in grass, 30.VI.1999, 1♂, 1♀, coll. H.

Hahniidae Bertkau, 1878
***Cryphoeca carpathica* Herman, 1879**
Published data. Hoverla Mt. (Legotay 1974: *C. silvicola c.*). Petros Mt. (Chyzer & Kulczyński 1897: *C. silvicola* var. *c.*).
Material. Bezimenna Mt. [B-1400], spruce forest, in moss, between stones, 10.VIII.2012, 3♂♂, coll. Zh. Brebeneskul Mt. [Br-2018], alpigenous acidophilous grassland, (*Festuca*) communities, in Icelandic moss, 9.VIII.2012, 1♂, 3♀♀; [Br-2035], the summit, under stones, 9.VIII.2012, 1♂; Breskul Mt. [Bre-1875], alpigenous acidophilous grassland, under stones, 7.VIII.2012, 1♀; Kedruvatyi Pohorilets' mt. spur [KP-1980], alpigenous acidophilous grassland, siliceous screes, in dead grass remains, 9.VIII.2012, 3♀♀; Munchel Mt. [Mu-1988], [Mu-1991], [Mu-1992], alpigenous acidophilous grassland, in Icelandic moss and under stones, 10.VIII.2012, 9♂♂, 11♀♀; Rebra Mt. [R-1988], same habitat, 10.VIII.2012, 1♀, coll. Zh.

***Cryphoeca silvicola* (C. L. Koch, 1834)**
Published data. Hoverla Mt. (Balogh 1940). Menchyl' Mt. (Prokopenko & Chumak 2007). Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Brebeneskul Mt. [Br-1982], siliceous screes, under stones, 24. VII.2014, 1♀; Dancer Mt. [D-1366], spruce forest, on the forest floor, 23.VII.2014, 5♀♀; Dzembronia Mt. [Dz-1836], alpigenous acidophilous grassland, under stones, 7.IX.2014, 1♀; coll. H. Hoverla Mt. [H-1398], upper limit of spruce forests, in moss under the trees, 11.VIII.2012, 1♀, coll. Zh. Kopytsia Mt. [Ko-1370], (*Vaccinium*) heaths, in moss, 10.VII.2012, 2♀♀; Munchel Mt. [Mu-1974], siliceous screes of the alpine level, under stones, 24.VII.2014, 5♀♀; Petros Mt. [P-1981], same habitat, VII.2011, 6♀♀; Pip Ivan Mt. [PI-1985], same habitat, 7.IX.2014, 1♀; [PI-1995], same habitat,

7.IX.2014, 1♀; Sytnyi f.n. [Syt-1208], old-growth beech forest, on the forest floor, 13.VII.2013, 2♀, coll. H.

Linyphiidae Blackwall, 1859
***Agnyphantes expunctus* (O. P.-Cambridge, 1875)**
Published data. Hoverla Mt. (Balogh & Loksa 1947b: *Lepthyphantes e.*).

***Agyneta affinis* (Kulczyński, 1898)**
Material. Petros Mt. [P-1981], siliceous screes of the alpine level, under stones, 26.VI.2012, 1♀, coll. H.

***Agyneta conigera* (O. P.-Cambridge, 1863)**
Material. Bezimenna Mt. [B-1370], secondary spruce forest, in grass, in moss, on the forest floor, 10.VIII.2012, 1♀; [B-1371], old-growth spruce forest, in moss and the forest floor, between blueberry branches, 10.VIII.2012, 1♀; Breskul Mt. [Bre-1710], subalpine tall grass (*Festuca*) communities, in dead grass remains and rodent burrows, 7.VIII.2012, 1♂, coll. Gn. Kizly f.n. [Ki-1539], (*Pinus mugo*) scrubs, on the forest floor, 24.VII.2014, 1♀; Pozhyzhevs'ka Mt. [Poz-1358], spruce forest, in herpetobium, 6.IX.2014, 1♀; Rogneska Mt. [Ro-1398], spruce forest, in moss, 15.VIII.2014, 1♀, coll. H.

***Agyneta milleri* (Thaler, Buchar & Kůrka, 1997)**
Material. Breskul Mt. [Bre-1710], subalpine tall grass (*Festuca*) communities, in dead grass remains and rodent burrows, 7.VIII.2012, 1♂, 3♀♀, coll. Gn. [Bre-1899], alpigenous acidophilous grassland, (*Juncus trifidus*) communities, in Icelandic moss and in dead grass remains, 7.VIII.2012, 1♀; Kedruvatyi Pohorilets' mt. spur [KP-1980], alpigenous acidophilous grassland, siliceous screes, in Icelandic moss, 9.VIII.2012, 1♂, coll. Zh. Petros Mt. [P-1981], siliceous screes of the alpine level, in dead grass remains, 26.VI.2012, 2♂♂, coll. H.

***Agyneta mollis* (O. P.-Cambridge, 1871)**
Material. Kizly f.n. [Ki-1740], peat shore of the Nesamovyte Lake, on the soil, between sedges, in moss, 8.VIII.2012, 1♀, coll. Gn.

***Agyneta mossica* (Schikora, 1993)**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).

***Agyneta rurestris* (C. L. Koch, 1836)**
Published data. Petros Mt. (Chyzer & Kulczyński 1894: *Micryphantes r.*). Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Kizly f.n. [Ki-1740], peat shore of the Nesamovyte Lake, on the soil, between sedges, in moss, 8.VIII.2012, 2♂♂, coll. Gn. Petros Mt. [P-1981], siliceous screes of the alpine level, under stones, 26.VI.2012, 2♂♂; Petrosul Mt. [Pe-1810], alpigenous acidophilous grassland, (*Juncus trifidus*) communities, under stones, 26.VI.2012, 2♂♂; Rogneska Mt. [Ro-1638], (*Juniperus*) thickets, on the forest floor, 26.VI.2012, 5♀♀; Tsybul'nyk f.n. [Ts-1375], an area with (*Pinus mugo*) scrubs, on the forest floor, 6.IX.2014, 1♀, coll. H.

***Anguliphantes tripartitus* (Miller & Svaton, 1978)**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007. Chumak et al. 2007).

Material. Dzembronia Mt. (f.n. Pohane Misce) [Dz-1841], alpenrose heath (*Rhododendron myrtifolium*), in Icelandic moss, 7.IX.2014, 3♂♂, 2♀♀, coll. H. Munchel Mt. [Mu-1992] alpigenous acidophilous grassland, (*Festuca*) communities, in Icelandic moss, 10.VIII.2012, 2♀♀, coll. Zh. Pozhyzhevs'ka Mt. [Poz-1358], spruce forest, in herpetobium, 6.IX.2014, 1♀, coll. H.

***Araeoncus humilis* (Blackwall, 1841)**
Published data. Hoverla Mt. (Chyzer & Kulczyński 1894; 1918: *Diplocephalus h.*).
Material. Kizly f.n. [Ki-1740], peat shore of the Nesamovyte Lake, on the soil, in moss, and between sedges, 8.VIII.2012, 1♀, coll. Gn.

***Asthenargus paganus* (Simon, 1884)**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).

***Bathyphantes approximatus* (O. P.-Cambridge, 1871)**
Material. Hoverla Mt. [H-1327], bank of the riv. Prut, spruce forest, in grass, 10.VIII.2006, 1♀, coll. Zh.

***Bathyphantes gracilis* (Blackwall, 1841)**
Material. Bezimenna Mt. [B-1347], spruce forest glades with (*Rumex*) communities, bank of the mountain stream, on the soil, between sedges, 9.VIII.2012, 1♀, coll. Gn.

***Bathyphantes nigrinus* (Westring, 1851)**
Material. Bezimenna Mt. [B-1347], spruce forest glades with (*Rumex*) communities, bank of the mountain stream, on the soil, between sedges, 9.VIII.2012, 3♀♀, coll. Gn. Keveliv f.n. [Ke-690], bank of the riv. Keveliv, on the riparian plants, 22.VI.2012, 1♂; Kvasy vil. [Kv-545], unvegetated gravel bank of the riv. Chorna Tysa, under stones, 22.VI.2012, 1♂, coll. H. Malyi Breskul Mt. [MB-1339], old-growth spruce forest, between sedges, 11.VIII.2012, 2♀♀; Tsybul'nyk f.n. [Ts-1378], an area with young spruces and juniper thickets, between sedges and grasses, 11.VIII.2012, 1♂, coll. Zh.

***Bolyphantes alticeps* (Sundevall, 1833)**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007).
Material. Bezimenna Mt. [B-1347], spruce forest glades with (*Rumex*) communities, bank of the mountain stream, on the soil, between sedges, 9.VIII.2012, 1♂, 3♀♀; same habitat, on trees branches, 9.VIII.2012, 1♂, 2♀♀; Breskul Mt. [Bre-1711], subalpine tall grass communities, bank of a mountain stream, 7.VIII.2012, 3♀♀, coll. Gn. Hoverla Mt. [H-1311], spruce forest, on grasses, 30.IX.2006, 1♀; Malyi Breskul Mt. [MB-1379], spruce forest edge, on the lower branches of trees, 11.VIII.2012, 2♂♂, 2♀♀, coll. Zh. Rogneska Mt. [Ro-1638], subalpine (*Juniperus*) thickets, on juniper branches, 26.VI.2012, 1♂; Sheshul Mt. [Sh-1542], same habitat, in herpetobium, 14.VIII.2014, 1♂, 1♀, coll. H. Tsybul'nyk f.n. [Ts-1378], an area with young spruces and juniper thickets, between sedges and grasses, in moss, 11.VIII.2012, 1♂; [Ts-1381], bank of the mountain stream, between sedges and grasses, 13.VIII.2012, 1♀, coll. Zh. [Ts-1382], in sphagnum moss, 11.VIII.2012, 1♂, 1♀; [Ts-1384], an area with green alder, willow and juniper bushes, between grasses, in moss,

and rodent burrows, 11.VIII.2012, 2♂♂, 5♀♀; [Ts-1385], an area with (*Pinus mugo*) scrubs, on the forest floor, between blueberry branches, 11.VIII.2012, 2♂♂; [Ts-1386], an area with spruces of different age on the edge of bog, on the lower branches of trees, 11.VIII.2012, 3♂, 1♀; Turkul Mt. [Tu-1710], subalpine tall grass communities, an area with (*Pinus mugo*) and (*Rhododendron myrtifolium*), between grasses, 8.VIII.2012, 2♀♀, coll. Gn.

Centromerita concinna **(Thorell, 1875)**
Published data. Menchul Kvasivs'kyi m. (Legotay 1974).

Centromerus arcanus **(O. P.-Cambridge, 1873)**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Bezimenna Mt. [B-1400], spruce forest, in moss, between stones, 10.VIII.2012, 4♂♂, coll. Zh. [B-1441], same habitat, 9.VIII.2012, 2♂♂, 3♀♀, coll. Gn. Dancer Mt. [D-1366], same habitat, 6.IX.2014, 2♀♀; Pip Ivan Mt. [PI-1681], (*Pinus mugo*) scrubs, on the forest floor, 7.IX.2014, 2♀♀; Shuryn Mt. (f.n. Maricheika) [Shur-1521], old-growth spruce forest, in moss, 8.IX.2014, 2♂♂, 3♀♀; Tsybul'nyk f.n. [Ts-1375], an area with (*Pinus mugo*) scrub, in herpetobium, 6.IX.2014, 1♂, 2♀♀, coll. H. [Ts-1384], an area with green alder, willow and juniper bushes, between grasses, in moss, and rodent burrows, 11.VIII.2012, 7♀♀; [Ts-1385], an area with (*Pinus mugo*) scrubs, on the forest floor, between blueberry branches, 11.VIII.2012, 2♀♀, coll. Gn.

Centromerus pabulator **(O. P.-Cambridge, 1875)**
Published data. Hoverla Mt. (Balogh 1940). Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Bezimenna Mt. [B-1347], spruce forest glades with (*Rumex*) communities, bank of the mountain stream, on the soil, between sedges, 9.VIII.2012, 1♂; [B-1370], secondary spruce forest, in moss, on the forest floor, 10.VIII.2012, 1♀; [B-1371], old-growth spruce forest, between blueberry branches, 10.VIII.2012, 1♂, 1♀; [B-1372], old-growth spruce broken forest, bank of a mountain stream, on stones, the forest floor, in moss, and between grasses, 10.VIII.2012, 1♂, 2♀♀; coll. Gn. Hutyn Tomnatyk Mt. [HT-2012], alpigenous acidophilous grassland, (*Festuca*) communities with (*Juniperus*) bushes, in dead grass remains, 8.VIII.2012, 2♀♀, coll. Zh. Kopytsia Mt. [Ko-1370], (*Vaccinium*) heaths, in dead grass remains, 10.VII.2012, 1♀; Pip Ivan Mt. [PI-1681], (*Pinus mugo*) scrubs, on the forest floor, 7.IX.2014, 1♂; Rogneska Mt. [Ro-1398], spruce forest, in moss, 15.VIII.2014, 1♂, 2♀♀; Sheshul Mt. [Sh-1601], subalpine (*Vaccinium*) heaths, on the forest floor, 8.VII.2014, 1♂; Shumneska [Shu-1205], beech forest, on the forest floor, 9.VII.2012, 1♂; Shuryn Mt. (Maricheika) [Shur-1521], old-growth spruce forest, in moss, 8.IX.2014, 1♀, coll. H. Tsybul'nyk f.n. [Ts-1381], bank of a mountain stream, between sedges and grasses, 13.VIII.2012, 1♀, coll. Zh. [Ts-1385], an area with (*Pinus mugo*) scrubs, on the forest floor, between blueberry branches, 11.VIII.2012, 1♂, 1♀; Turkul Mt. [Tu-1710], subalpine tall grass communities, an area with (*Pinus mugo*) and [*Rhododendron myrtifolium*], between grasses, 8.VIII.2012, 4♂♂, 9♀♀, coll. Gn.

Centromerus sellarius **(Simon, 1884)**
Published data. Menchyl' Mt. (Prokopenko & Chumak 2007).

Centromerus silvicola **(Kulczyński, 1887)**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007).

Centromerus sylvaticus **(Blackwall, 1841)**
Published data. Hoverla Mt. (Balogh 1940: *C. silvaticus*). Menchyl' Mt. (Prokopenko & Chumak 2007). Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Bezimenna Mt. [B-1369], old-growth spruce broken forest, gentle slope with (*Vaccinium*) communities, on the forest floor, in moss, 10.VIII.2012, 2♀♀, coll. Gn. Malyi Breskul Mt. [MB-1337], old-growth spruce forest, on the spider's web near treeroots, 11.VIII.2012, 1♂; [MB-1339], old-growth spruce forest, between sedges, 11.VIII.2012, 1♀, coll. Zh. Pozhyzhevs'ka Mt. [Poz-1358], spruce forest, in herpetobium, 23.VII.2014, 1♀, 6.IX.2014, 1♂, 2♀♀; [Poz-1521], green alder scrubs, 6.IX.2014, 1♀; Rogneska Mt. [Ro-1638], (*Juniperus*) thickets, on the forest floor, 26.VI.2012, 5♀♀; Sytnyi f.n. [Syt-1208], old-growth beech forest, on the forest floor, 13.VII.2013, 3♂♂, 1♀, coll. H. Tsybul'nyk f.n. [Ts-1381], bank of a mountain stream, between sedges and grasses, 13.VIII.2012, 1♂, 2♀♀, coll. Zh.

Ceratinella brevipes **(Westring, 1851)**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Bezimenna Mt. [B-1369], old-growth spruce broken forest, gentle slope with (*Vaccinium*) communities, 10.VIII.2012, 2♀♀; [B-1371], old-growth spruce forest, between blueberry branches, on the forest floor, in moss, 10.VIII.2012, 1♀, coll. Gn. Breskul Mt. [Bre-1899], alpigenous acidophilous grassland, (*Juncus trifidus*) communities, in Icelandic moss, in dead grass remains, 7.VIII.2012, 1♀, coll. Zh. Dancer Mt. [D-1366], spruce forest, on the forest floor, 6.IX.2014, 2♀♀; Sheshul Mt. [Sh-1601], subalpine (*Vaccinium*) heaths, on the forest floor, 8.VII.2014, 1♀, coll. H. Tsybul'nyk f.n. [Ts-1378], an area with young spruces and juniper thickets, between sedges and grasses, in moss, 11.VIII.2012, 1♂, coll. Zh.

Ceratinella brevis **(Wider, 1834)**
Published data. Hoverla Mt. (Balogh 1940). Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Bezimenna Mt. [B-1370], secondary spruce forest, in grass, in moss, on the forest floor, 10.VIII.2012, 1♀, coll. Gn. Kopytsia Mt. [Ko-1370], (*Vaccinium*) heaths, in moss, in dead grass remains, 10.VII.2012, 1♀; Sytnyi f.n. [Syt-1208], old-growth beech forest, on the forest floor, 13.VII.2013, 1♂, coll. H.

Cnephalocotes obscurus **(Blackwall, 1834)**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Tsybul'nyk f.n. [Ts-1375], an area with scrubs (*Pinus mugo*), on the forest floor, 6.IX.2014, 1♂, coll. H.

Dicymbium cf. nigrum **(Blackwall, 1834)**
Published data. Hoverla Mt. (Chyzer & Kulczyński 1894, 1918).

Dicymbium tibiale **(Blackwall, 1836)**
Published data. Hoverla Mt. (Balogh & Loksa 1947a). Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).

Material. Petros Mt. [P-1981], siliceous screes, under stones, 26.VI.2012, 1♂, 3♀♀, coll. H. Tsybul'nyk f.n. [Ts-1381], bank of the mountain stream, between sedges and grasses, 13.VIII.2012, 3♀♀, coll. Zh.

Diplocentria bidentata **(Emerton, 1882)**
Material. Sheshul Mt. [Sh-1393], old-growth spruce forest, in moss, 8.VII.2014, 1♂; Shuryn Mt. (Maricheika) [Shur-1521], same habitat, 8.IX.2014, 2♂♂, 3♀♀, coll. H.

Diplocephalus cristatus **(Blackwall, 1833)**
Material. Vesnarka m. [V-991], mountain hay meadows, in dead grass remains, VII.1999, 1♂, coll. H.

Diplocephalus helleri **(L. Koch, 1869)**
Published data. Hoverla Mt. (Balogh 1940: *Plaesiocraerus H.*).
Material. Bezimenna Mt. [B-1416], old-growth spruce forest, gravel of the dry mountain stream, on and under stones, 9.VIII.2012, 2♂♂, 1♀; Breskul Mt. [Bre-1711], subalpine tall grass communities, bank of the mountain stream, between stones, 7.VIII.2012, 1♂, 3♀♀, coll. Gn. Dancer Mt. [D-1650], tall grass communities, bank of the mountain stream, under stones, 21.VII.2014, 1♀; Hoverla Mt. [H-1630], tall grass communities, bank of the stream, between stones, VII.2011, 1♂; Kopytsia Mt. [Ko-1230], beech forest, bank of the stream, under stones, 12.VII.2013, 2♀♀; Sheshul Mt. [Sh-1487], green alder scrubs, in moss, 2.VII.1999, 1♀; Shumneska m. [Shum-1315], bank of the riv. Shumneska, under stones, 9.VII.2012, 1♀, coll. H.

Diplocephalus latifrons **(O. P.-Cambridge, 1863)**
Published data. Hoverla Mt. (Balogh & Loksa 1947a: *Plaesiocraerus l.*). Menchyl' Mt.; Pozhyzhevs'ka m. (Prokopenko & Chumak 2007). Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007. Chumak et al. 2007).
Collections. Hoverla Mt. [labelled: Czarna hóra, pod szczytem Howerli], 1♀ (MiIZ, coll. Stobiecki, det. H.).
Material. Bezimenna Mt. [B-1369], old-growth spruce broken forest, gentle slope with (*Vaccinium*) communities, in moss, 10.VIII.2012, 7♂♂, 12♀♀; [B-1370], secondary spruce forest, in grass, in moss, and on the forest floor, 10.VIII.2012, 3♀♀; [B-1371], old-growth spruce forest, between blueberry branches, on the forest floor, in moss, 10.VIII.2012, 10♂♂, 11♀♀; Breskul Mt. [Bre-1710], subalpine tall grass (*Festuca*) communities, in dead grass remains and rodent burrows, 9♂♂, 6♀♀; [Bre-1711], subalpine tall grass communities, bank of the mountain stream, between stones, 7.VIII.2012, 1♂, 1♀, coll. Gn. [Bre-1899], alpigenous acidophilous grassland, (*Juncus trifidus*) communities, in Icelandic moss and in dead grass remains, 7.VIII.2012, 1♀, coll. Zh. Dancer Mt. [D-1366], spruce forest, on the forest floor, 23.VII.2014, 4♂♂, 6♀♀, 6.IX.2014, same habitat, 1♂♂, 4♀♀, coll. H. Hoverla Mt. [H-1607], tall grass communities with (*Juniperus*) thickets, under juniper branches, between grasses, 30.IX.2006, 1♀, coll. Zh. [H-1630], tall grass communities, bank of the stream, between stones, VII.2011, 1♂; Kopytsia Mt. [Ko-1370], (*Vaccinium*) heaths, in dead grass remains, 10.VII.2012, 2♂♂, 1♀, coll. H. Malyi Breskul Mt. [MB-1337], old-growth spruce forest, on the spider's web near treeroots, 11.VIII.2012, 1♀; [MB-1339], old-growth spruce forest, between grasses, 11.VIII.2012, 1♂, 1♀, coll. Zh. Petros Mt. [P-1812], subalpine (*Juniperus*) thickets, in Icelandic moss, 26.VI.2012, 1♂, 1♀; Pip Ivan Mt. [PI-1681], (*Pinus mugo*) scrubs, on the forest floor, 7.IX.2014, 3♀♀; Pozhyzhevs'ka m. [Po-1533], subalpine tall grass communities, in herpetobium, 3♀♀; Pozhyzhevs'ka Mt. [Poz-1358], spruce forest, in herpetobium, 23.VII.2014, 1♂, 7♀♀, 6.IX.2014, same habitat, 1♂, 2♀♀; [Poz-1521], green alder scrubs, in herpetobium, 26.VII.2014, 2♂♂, 4♀♀; Rogneska Mt. [Ro-1638], (*Juniperus*) thickets, on the forest floor, 26.VI.2012, 4♀♀; Shumneska m. [Shum-1315], bank of the riv. Shumneska, under stones, 9.VII.2012, 3♀♀; Sytnyi f.n. [Syt-1208], old-growth beech forest, on the forest floor, 13.VII.2013, 3♀♀; Tsybul'nyk f.n. [Ts-1375], an area with (*Pinus mugo*) scrub, in herpetobium, 26.VII.2014, 1♂♂, coll. H. Turkul Mt. [Tu-1710], subalpine tall grass communities, an area with (*Pinus mugo*) and (*Rhododendron myrtifolium*), between grasses, 8.VIII.2012, 6♂♂, 19♀♀, coll. Gn.

Diplocephalus picinus **(Blackwall, 1841)**
Published data. Menchyl' Mt. (Prokopenko & Chumak 2007).

Diplostyla concolor **(Wider, 1834)**
Published data. Hoverla Mt. (Balogh & Loksa 1947b: *Stylophora c.*). Menchyl' Mt. (Prokopenko & Chumak 2007).
Material. Hoverla Mt. [H-1311], spruce forest, between grasses, 30.IX.2006, 1♂, coll. Zh. Kopytsia Mt. [Ko-1370], (*Vaccinium*) heaths, in moss, 10.VII.2012, 6♀♀; Kvasy vil. [Kv-545], gravel banks of the riv. Chorna Tysa, 22.VI.2012, 1♀; Petros Mt. [P-1981], siliceous screes, under stones, 26.VI.2012, 1♂; Sytnyi f.n. [Syt-1208], old-growth beech forest, on the forest floor, 13.VII.2013, 2♀♀, coll. H.

Drapetisca socialis **(Sundevall, 1833)**
Published data. Menchyl' Mt.; Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007).
Collections. Zarosliak f.n. [labelled: Zaroślak], 22.VIII.1934, 2♀♀ (MPUWr, coll. et det. S. Pilawski).
Material. Bezimenna Mt. [B-1347], spruce forest glades, on trees branches, 9.VIII.2012, 1♀; [B-1373], spruce forest edge, on trees branches, 10.VIII.2012, 1♂, 2♀♀, coll. Gn. Hoverla Mt. [H-1311], spruce forest, on the tree bark, 30.IX.2006, 1♂; [H-1398], upper limit of the spruce forests, on the lower branches of trees, 11.VIII.2012, 1♀, coll. Zh. Kvasy vil. [Kv-745], beech forest, on the tree bark, 16.VII.2013, 2♀♀, coll. H. Tsybul'nyk f.n. [Ts-1386], an area with spruces of different age on edge of the bog, on the lower branches of trees, 11.VIII.2012, 1♀, coll. Gn.

Erigone dentipalpis **(Wider, 1834)**
Published data. Hoverla Mt. (Balogh & Loksa 1947b).
Material. Pozhyzhevs'ka Mt. [Poz-1358], spruce forest, in herpetobium, 23.VII.2014, 1♂; Rogneska Mt. [Ro-1638], (*Juniperus*) thickets, on the forest floor, 26.VI.2012, 1♂, coll. H.

Erigone tirolensis **L. Koch, 1872**
Material. Breskul Mt. [Bre-1711], subalpine tall grass communities, bank of the mountain stream, between stones, 7.VIII.2012, 1♀; Kizly f.n. [Ki-1740], peat shore of the Nesamovyte Lake, on the soil, between sedges, in moss, 8.VIII.2012, 4♂♂, 6♀♀, coll. Gn.

***Formiphantes* sp.**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007).

***Gonatium orientale* Fage, 1931**
Material. Bezimenna Mt. [B-1372], old-growth spruce broken forest, bank of the mountain stream, on stones, in moss, between grasses, 10.VIII.2012, 1♂; Breskul Mt. [Bre-1709], bank of the mountain stream, between stones, 7.VIII.2012, 4♀♀; [Bre-1710], subalpine tall grass (*Festuca*) communities, in dead grass remains and rodent burrows, 7.VIII.2012, 2♂♂, 3♀♀; Malyi Breskul Mt. [MB-1405], tall grass communities with juniper bushes, on the stony slope, in grass, under stones, 13.VIII.2012, 1♂, coll. Gn. Tsybul'nyk f.n. [Ts-1375], an area with (*Pinus mugo*) scrub, in herpetobium, 6.IX.2014, 1♂, coll. H. [Ts-1385], same habitat, on the forest floor, between blueberry branches, 11.VIII.2012, 1♂; [Ts-1386], an area with spruces of different age on the edge of the bog, on the lower branches of trees, 11.VIII.2012, 1♀, coll. Gn.

Gonatium rubellum (Blackwall, 1841)
Published data. Menchyl' Mt. (Prokopenko & Chumak 2007). Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Hoverla Mt. [H-1398], upper limit of spruce forests, on the lower branches of trees, 11.VIII.2012, 1♀; Tsybul'nyk f.n. [Ts-1373], an area with (*Pinus mugo*) and juniper bushes, on juniper branches, 11.VIII.2012, 1♀, coll. Zh.

***Hilaira excisa* (O. P.-Cambridge, 1871)**
Material. Breskul Mt. [Bre-1711], subalpine tall grass communities, bank of a mountain stream, between stones, 7.VIII.2012, 4♂♂, 2♀♀, coll. Gn. Tsybul'nyk f.n. [Ts-1378], an area with young spruces and juniper thickets, between sedges and grasses, in moss, 11.VIII.2012, 1♂, 10♀, coll. Zh. [Ts-1384], an area with green alder, willow and juniper bushes, between grasses, in moss, and rodent burrows, 11.VIII.2012, 2♂♂, 15♀♀; Turkul Mt. [Tu-1710], subalpine tall grass communities, an area with (*Pinus mugo*) and (*Rhododendron myrtifolium*), between grasses, 8.VIII.2012, coll. Gn.

***Incestophantes annulatus* (Kulczyński, 1882)**
Material. Brebeneskul Mt. [Br-2027], alpigenous acidophilous grassland, (*Festuca*) communities, in Icelandic moss, 9.VIII.2012, 2♂♂; [Br-2030], same habitat, 9.VIII.2012, 4♂♂, 1♀; Kedruvatyi Pohorilets' mt. spur [KP-1980], alpigenous acidophilous grassland, (*Festuca*) communities, siliceous screes, in Icelandic moss, 9.VIII.2012, 2♂♂, 1♀; Munchel Mt. [Mu-1988], same habitat, 10.VIII.2012, 1♂, coll. Zh.

***Kaestneria dorsalis* (Wider, 1834)**
Published data. Tovstyi Hrun' f.n. (Prokopenko & Chumak 2007).
Material. Shumneska m. [Shum-1315], bank of the riv. Shumneska, under stones, 9.VII.2012, 1♀, coll. H.

***Kaestneria torrentum* (Kulczyński, 1882)**
Published data. Petros Mt. (Chyzer & Kulczyński 1894, 1918: *Bathyphantes t.*).
Material. Bezimenna Mt. [B-1347], spruce forest glades with (*Rumex*) communities, bank of the mountain stream, on the soil, between sedges, 9.VIII.2012, 1♀; [B-1372], old-growth spruce broken forest, bank of the mountain stream, on the stones, in moss, 10.VIII.2012, 1♂, 1♀; [B-1416] old-growth spruce forest, gravel of the dry mountain stream, on and under stones, 9.VIII.2012, 2♂♂, 5♀♀; Breskul Mt. [Bre-1711], subalpine tall grass communities, bank of the mountain stream, between stones, 7.VIII.2012, 16♂♂, 38♀♀, coll. Gn. Hoverla Mt. [H-1630], same habitat, VII.2011, 4♀♀; Shumneska m. [Shum-1315], bank of the riv. Shumneska, under stones, 9.VII.2012, 2♀♀, coll. H.

***Labulla thoracica* (Wider, 1834)**
Published data. Hoverla Mt. (Balogh 1940).

***Lepthyphantes leprosus* (Ohlert, 1865)**
Material. Kvasy vil. [Kv-545], gravel bank of the riv. Chorna Tysa, under stones, 22.VI.2012, 1♀; Sheshul Mt. [Sh-1601], subalpine (*Vaccinium*) heaths, on the forest floor, 8.VII.2014, 1♂; Sytnyi f.n. [Syt-1208], old-growth beech forest, on the forest floor, 13.VII.2013, 1♀, coll. H.

***Leptorhoptrum robustum* (Westring, 1851)**
Published data. Hoverla Mt. (Balogh 1940: *L. Huthwaiti* (Cambr.)).

Lessertinella carpatica **Weiss, 1979**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Shuryn Mt. (Maricheika) [Shur-1521], primary spruce forest, in moss, 8.IX.2014, 1♂; Sytnyi f.n. [Syt-1208], old-growth beech forest, on the forest floor, 10.VII.2012, 1♀, coll. H. Tsybul'nyk f.n. [Ts-1384], an area with green alder, willow and juniper bushes, between grasses, in moss, in rodent burrows, 11.VIII.2012, 1♂, coll. Gn.

***Linyphia triangularis* (Clerck, 1757)**
Published data. Menchyl' Mt.; Tovstyi Hrun' f.n. (Prokopenko & Chumak 2007).
Material. Pip Ivan Mt. [PI-1681], (*Pinus mugo*) scrubs, on bush branches, 7.IX.2014, 2♀♀; Shybenyi vil. [Shy-876], on a wooden fence, 8.IX.2014, 1♀; Sytnyi m. [Sy-953], mountain hay meadows, in grass, 30.VI.1999, 1♀, coll. H.

***Macrargus rufus* (Wider, 1834)**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007).
Material. Chertizh f.n. [Che-999], beech forest edge, on the forest floor, 16.VII.2013, 1♀, coll. H.

***Mansuphantes arciger* (Kulczyński, 1882)**
Published data. Petros Mt. (Chyzer & Kulczyński 1894, 1918: *Lephthyphantes a.*).
Material. Rogneska Mt. [Ro-1638], subalpine (*Juniperus*) thickets, in herpetobium, 26.VI.2012, 1♀, coll. H.

***Mansuphantes mansuetus* (Thorell, 1875)**
Published data. Hoverla Mt. (Balogh & Loksa 1947b: *Lepthyphantes m.*).
Material. Sheshul Mt. [Sh-1542], subalpine (*Juniperus*) thickets, in herpetobium, 14.VIII.2014, 1♀, coll. H.

Maro minutus **O. P.-Cambridge, 1906**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Bezimenna Mt. [B-1441], spruce forest, in moss, club mosses, in the cavities between stones, 9.VIII.2012, 1♀, coll. Gn. Dancer Mt. [D-1366], spruce forest, on the forest floor, 23.VII.2014, 1♀, coll. H.

Maso sundevalli **(Westring, 1851)**
Published data. Hoverla Mt. (Legotay 1974). Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007).
Material. Bezimenna Mt. [B-1347], spruce forest glades with (*Rumex*) communities, bank of the mountain stream, on the soil, between sedges, 9.VIII.2012, 2♀, coll. Gn. Kopytsia Mt. [Ko-1370], (*Vaccinium*) heaths, in moss, in dead grass remains, 10.VII.2012, 1♂, 1♀; Pip Ivan Mt. [PI-1681], (*Pinus mugo*) scrubs, on the forest floor, 7.IX.2014, 1♀; Sytnyi f.n. [Syt-1208], old-growth beech forest, on the forest floor, 13.VII.2013, 3♀; Tsybul'nyk f.n. [Ts-1375], an area with (*Pinus mugo*) scrubs, on the forest floor, 6.IX.2014, 1♂, coll. H.

Mecynargus morulus **(O. P.-Cambridge, 1873)**
Material. Brebeneskul Mt. [Br-1982], siliceous screes of the alpine level, under stones, 24.VII.2014, 1♀; Pip Ivan Mt. [PI-1985], moss and lichen dominated mountain summit, in Icelandic moss, 7.IX.2014, 1♀; [PI-1995], siliceous screes, under stones, 7.IX.2014, 1♀, coll. H.

Micrargus georgescuae **Millidge, 1976**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Bezimenna Mt. [B-1369], old-growth spruce broken forest, gentle slope with (*Vaccinium*) communities, on the forest floor, in moss, 10.VIII.2012, 1♂, 1♀, coll. Gn. Pozhyzhevs'ka Mt. [Poz-1358], spruce forest, in herpetobium, 23.VII.2014, 1♂, 1♀, coll. H. Tsybul'nyk f.n. [Ts-1385], an area with (*Pinus mugo*) scrubs, on the forest floor, between blueberry branches, 11.VIII.2012, 1♂, 5♀♀, coll. Gn.

Micrargus herbigradus **(Blackwall, 1854)**
Published data. Hoverla Mt. (Balogh & Loksa 1947b: *Blaniargus h.*). Menchyl' Mt. (Prokopenko & Chumak 2007).
Material. Sytnyi f.n. [Syt-1208], old-growth beech forest, on the forest floor, 13.VII.2013, 1♀, coll. H.

Micrargus **sp.**
Material. Bezimenna Mt. [B-1371], old-growth spruce forest, between blueberry branches, on the forest floor, and in moss, 10.VIII.2012, 2♂♂, 2♀♀, coll. Gn. Breskul Mt. [Bre-1900], alpigenous acidophilous grassland, (*Juncus trifidus*) communities, under juniper branches, 7.VIII.2012, 1♀, coll. Zh. Dancer Mt. [D-1366], spruce forest, in herpetobium, 23.VII.2014, 1♀; Dzembronia Mt. (Pohane Misce) [Dz-1841], alpenrose heath (*Rhododendron myrtifolium*), in Icelandic moss, 7.IX.2014, 2♀♀, coll. H. Hutyn Tomnatyk Mt. [HT-2011], siliceous screes, in dead grass remains, 8.VIII.2012, 1♂, 1♀; [HT-2012], alpigenous acidophilous grassland, (*Festuca*) communities with (*Juniperus*) thickets, in dead grass remains, 8.VIII.2012, 1♂; Munchel Mt. [Mu-1991], alpigenous acidophilous grassland, (*Festuca*) communities, in Icelandic moss, 10.VIII.2012, 1♀, coll. Zh. Petros Mt. [P-1981], siliceous screes, under stones, 26.VI.2012, 1♂; Pip Ivan Mt. [PI-1985], moss and lichen dominated mountain summit, 7.IX.2014, 1♀; [PI-1995], siliceous screes, under stones, 7.IX.2014, 2♀♀; Shuryn Mt. [Shur-1521] (Maricheika) old-growth spruce forest, in moss, 8.IX.2014, 1♂, 1♀, coll. H. Turkul Mt. [Tu-1710], subalpine tall grass communities, an area with (*Pinus mugo*) and (*Rhododendron myrtifolium*), between grasses, 8.VIII.2012, 1♂, coll. Gn.

Microlinyphia pusilla **(Sundevall, 1830)**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).

Microneta viaria **(Blackwall, 1841)**
Material. Dzhordzheva pryluka m. [DP-1023], mountain hay meadows, in dead grass remains, 16.VII.2013, 1♀; Sytnyi f.n. [Syt-1208], old-growth beech forest, on the forest floor, 13.VII.2013, 1♀, coll. H.

Minicia marginella **(Wider, 1834)**
Published data. Hoverla Mt. (Legotay 1974).

Minyriolus pusillus **(Wider, 1834)**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Dancer Mt. [D-1366], spruce forest, on the forest floor, 6.IX.2014, 1♂, 2♀♀; Kizly f.n. [Ki-1539], (*Pinus mugo*) scrubs, on the forest floor, 24.VII.2014, 1♀; Pip Ivan Mt. [PI-1681], same habitat, 7.IX.2014, 1♀; Sheshul Mt. [Sh-1393], old-growth spruce forest, in moss, 8.VII.2014, 1♂; Shuryn Mt. (Maricheika) [Shur-1521], same habitat, 8.IX.2014, 1♂, coll. H.

Mughiphantes mughi **(Fickert, 1875)**
Published data. Hoverla Mt. (Balogh & Loksa 1947b: *Lepthyphantes M.*). Menchyl' Mt. (Prokopenko & Chumak 2007). Petros Mt. (Chyzer & Kulczyński 1894: *Lephthyphantes M.*). Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Bezimenna Mt. [B-1347], spruce forest glades, on trees branches, 9.VIII.2012, 4♂♂, 8♀♀; [B-1369], old-growth spruce broken forest, gentle slope with (*Vaccinium*) communities, on the forest floor, in moss, 10.VIII.2012, 2♂♂, 4♀♀; [B-1370], secondary spruce forest, in grass, in moss, on the forest floor, 10.VIII.2012, 2♀♀; [B-1371], old-growth spruce forest, between blueberry branches, on the forest floor, in moss, 10.VIII.2012, 8♂♂, 4♀♀; [B-1372], old-growth spruce broken forest, bank of a mountain stream, on stones, on the forest floor, in moss, between grasses, 10.VIII.2012, 7♀♀; [B-1373], spruce forest edge, on trees branches, 10.VIII.2012, 10♂♂, 31♀♀, coll. Gn. Breskul Mt. [Bre-1900], alpigenous acidophilous grassland, (*Juncus trifidus*) communities, under juniper branches, 7.VIII.2012, 1♂, coll. Zh. Dancer Mt. [D-1366], spruce forest, on the forest floor, on trees branches, 23.VII.2014, 5♀♀, 6.IX.2014, 5♂♂, 13♀♀, coll. H. Hoverla Mt. [H-1388], upper limit of spruce forests, on the lower branches of trees, 30.IX.2006, 5♂♂, 13♀♀; [H-1398], same habitat, 11.VIII.2012, 2♂♂, 11♀♀; [H-1502], tall grass communities, on juniper branches, 30.IX.2006, 5♂♂, 9♀♀, coll. Zh. Petros Mt. [P-1981], siliceous screes, under stones, 26.VI.2012, 1♂, 2♀♀; Pozhyzhevs'ka Mt. [Poz-1358], spruce forest, in herpetobium,

6.IX.2014, 5♂♂, 3♀♀, coll. H. Rebra Mt. [R-1988], alpigenous acidophilous grassland, 10.VIII.2012, 1♂, 4♀♀, coll. Zh. Rogneska Mt. [Ro-1638], (*Juniperus*) thickets, on the forest floor, 26.VI.2012, 1♂; Shumneska m. [Shum-1315], bank of the riv. Shumneska, under stones, 9.VII.2012, 1♀, coll. H. Tsybul'nyk f.n. [Ts-1373], an area with (*Pinus mugo*) and juniper bushes, on juniper branches, 11.VIII.2012, 3♂♂, coll. Zh. [Ts-1385], an area with (*Pinus mugo*) scrubs, on the forest floor, between blueberry branches, 11.VIII.2012, 1♀; [Ts-1386], an area with spruces of different age on the edge of the bog, on the lower branches of trees, 11.VIII.2012, 4♂♂, 25♀♀; Turkul Mt. [Tu-1710], subalpine tall grass communities, an area with (*Pinus mugo*) and (*Rhododendron myrtifolium*), between grasses, 8.VIII.2012, 1♂, 3♀♀, coll. Gn.

Neriene emphana **(Walckenaer, 1841)**
Published data. Polonyna Gropa m. (Legotay 1974: *Linyphia e.*).
Material. Dzhordzheva pryluka m. [DP-1023], mountain hay meadows, in grass, 16.VII.2013, 1♀; Menchul Kvasivs'kyi m. [MKv-1216], upper limit beech forests, on trees branches, 3.VII.1999, 3♂, 3♀; Sytnyi m. [Sy-953], mountain hay meadows, in grass, 30.VI.1999, 1♀; Sytnyi f.n. [Syt-1208], old-growth beech forest, on tree branches, 10.VII.2012, 1♀; Vesnarka m. [V-1079], mountain hay meadows, in grass, 28.VI.2012, 2♂, coll. H.

Neriene furtiva **(O. P.-Cambridge, 1871)**
Material. Petros Mt. [P-1981], siliceous screes of the alpine level, under stones, 12.VIII.2014, 1♀, coll. H.

Neriene montana **(Clerck, 1757)**
Material. Sytnyi f.n. [Syt-1208], old-growth beech forest, on tree branches, 13.VII.2013, 1♀, coll. H.

Neriene peltata **(Wider, 1834)**
Published data. Menchyl' Mt. (Prokopenko & Chumak 2007). Petros Mt. (Chyzer & Kulczyński 1894: *Linyphia p.*).
Collections. Voronenko vil. [labelled: Woronieczka, Woronienka], 7.VIII.1935, 4♀♀. Kukul mt. range [labelled: Kukul], 18.VIII.1935, 3♀♀ (MPUWr, coll. et det. S. Pilawski).
Material. Keveliv f.n. [Ke-690], bank of the riv. Keveliv, on the riparian plants, 5.VII.1999, 1♀, 22.VI.2012, same habitat, 1♂, coll. H.

Neriene radiata **(Walckenaer, 1841)**
Material. Kizly f.n. [Ki-1539], (*Pinus mugo*) scrubs, on the lower branches of bushes, 24.VII.2014, 1♀, coll. H.

Obscuriphantes obscurus **(Blackwall, 1841)**
Published data. Petros Mt. (Chyzer & Kulczyński 1894, 1918: *Lephthyphantes o.*).
Material. Shuryn Mt. (Maricheika) [Shur-1521], old-growth spruce forest, in moss, 8.IX.2014, 1♂, coll. H. Tsybul'nyk f.n. [Ts-1386], an area with spruces of different age on the edge of the bog, on the lower branches of trees, 11.VIII.2012, 1♀, coll. Gn.

Oedothorax agrestis **(Blackwall, 1853)**
Published data. Hoverla Mt. (Balogh & Loksa 1947b).
Material. Kvasy vil. [Kv-545], gravel bank of the riv. Chorna Tysa, under stones, 22.VI.2012, 2♂, 4♀♀; Shybenyi vil. [Shy-922], gravel bank of the riv. Shybenyi, between stones, 8.IX.2014, 1♀, coll. H.

Oedothorax apicatus **(Blackwall, 1850)**
Published data. Luhy vil. (Prokopenko & Chumak 2007).

Oedothorax gibbifer **(Kulczyński, 1882)**
Published data. Tovstyi Hrun' (Prokopenko & Chumak 2007).
Material. Bezimenna Mt. [B-1347], spruce forest glades with (*Rumex*) communities, bank of the mountain stream, on the soil, between sedges, 9.VIII.2012, 3♂♂, 9♀♀, coll. Gn. Tsybul'nyk f.n. [Ts-1381], bank of the mountain stream, on the riparian plants, 11.VIII.2012, 1♂, coll. Zh. [Ts-1384], area with green alder, willow and juniper bushes, between grasses, in moss, in the rodent burrows, 11.VIII.2012, 3♂♂, 3♀♀, coll. Gn.

Oedothorax retusus **(Westring, 1851)**
Collections. Hoverla Mt. [labelled: Czarna hóra, pod szczytem Howerli], 1♀ (MIIZ, coll. Stobiecki, det. H).
Material. Brebeneskul Mt. [Br-1900], the mountain stream, on the soil, 10.VIII.2012, 1♀, coll. Zh. Hoverla Mt. [H-1630], tall grass communities, bank of the stream, between stones, VII.2011, 1♀, coll. H.

Oreoneta tatrica **(Kulczyński, 1915)**
Material. Shuryn Mt. [Shur-1521] (Maricheika f.n.), old-growth spruce forest, in moss, 8.IX.2014, 2♂♂, 2♀♀, coll. H.

Palliduphantes milleri **(Staręga, 1972)**
Published data. Hoverla Mt. (Balogh & Loksa 1947b: *Lepthyphantes montanus* Kulcz., Pekár et al. 1999). Menchyl' Mt. (Prokopenko & Chumak 2007). Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Dancer Mt. [D-1366], spruce forest, in herpetobium, 23.VII.2014, 2♀♀; Keveliv f.n. [Ke-690], bank of the riv. Keveliv, on the riparian plants, 5.VII.1999, 1♂, 1♀; Pozhyzhevs'ka Mt. [Poz-1358], spruce forest, in herpetobium, 23.VII.2014, 1♀; [Poz-1521], subalpine green alder scrubs, in herpetobium, 26.VII.2014, 3♂♂, coll. H.

Pelecopsis elongata **(Wider, 1834)**
Published data. Menchyl' Mt. (Prokopenko & Chumak 2007).

Pelecopsis radicicola **(L. Koch, 1872)**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Brebeneskul Mt. [Br-2030], alpigenous acidophilous grassland, (*Festuca*) communities, in Icelandic moss, 9.VIII.2012, 2♀♀, coll. Zh. Breskul Mt. [Bre-1710], subalpine tall grass (*Festuca*) communities, in dead grass remains and rodent burrows, 7.VIII.2012, 1♂, 4♀♀, coll. Gn. Kedruvatyi Pohorilets' mt. spur [KP-1980], alpigenous acidophilous grassland, (*Festuca*) communities, siliceous screes, in Icelandic moss, 9.VIII.2012, 1♂, 5♀♀, in dead grass remains, 1♂, 1♀, 9.VIII.2012, coll. Zh. Kopytsia Mt. [Ko-1370], (*Vaccinium*) heaths, in moss, in dead grass remains, 10.VII.2012, 2♂♂; Pip Ivan Mt. [PI-1681], subalpine (*Pinus mugo*) scrubs, on the forest floor, 7.IX.2014, 2♀♀; Tsybul'nyk f.n. [Ts-1375], an area with (*Pinus mugo*) scrub, in herpetobium, 26.VII.2014, 2♂♂, 1♀, 6.IX.2014, 1♀, coll. H.

Pityohyphantes phrygianus **(C. L. Koch, 1836)**
Published data. Menchyl' Mt. (Prokopenko & Chumak 2007); Petros Mt. (Chyzer & Kulczyński 1894: *Linyphia ph.*).
Material. Menchul Kvasivs'kyi m. [MKv-1205], LNU field station, on the outside walls, 15.VII.2013, 1♀, coll. H.

Pocadicnemis carpatica **(Chyzer, 1894)**
Material. Malyi Breskul Mt. [MB-1339], old-growth spruce forest, between grasses, 11.VIII.2012, 2♀♀, coll. Zh.

Poeciloneta variegata **(Blackwall, 1841)**
Collections. Hoverla Mt. [labelled: Howerla], 22.VII.1934, 1♂, 2♀♀ (MPUWr, coll. et det. S. Pilawski).
Material. Hutyn Tomnatyk Mt. [HT-2010], siliceous screes of the alpine level, under stones, 8.VIII.2012, 2♂♂, 9♀♀, coll. Zh.

Porrhomma convexum **(Westring, 1851)**
Material. Bezimenna Mt. [B-1416] old-growth spruce forest, gravel bank of the dry mountain stream, on and under stones, 9.VIII.2012, 1♀, coll. Gn.

Porrhomma pallidum **Jackson, 1913**
Material. Bezimenna Mt. [B-1441], spruce forest, in moss, club mosses, on stones and in the cavities between stones, 9.VIII.2012, 1♀, coll. Gn. Brebeneskul Mt. [Br-1982], siliceous screes of the alpine level, under stones, 24.VII.2014, 2♀♀, coll. H.

Saloca kulczynskii **Miller & Kratochvíl, 1939**
Published data. Menchyl' Mt.; Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007).
Material. Bezimenna Mt. [B-1370], secondary spruce forest, in grass, in moss, and on the forest floor, 10.VIII.2012, 5♀, coll. Gn.
Silometopus reussi **(Thorell, 1871)**
Material. Breskul Mt. [Bre-1711], subalpine tall grass communities, bank of a mountain stream, between stones, 7.VIII.2012, 1♀, coll. Gn.

Sintula corniger (Blackwall, 1856)
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).

Stemonyphantes lineatus **(Linnaeus, 1758)**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Bezimenna Mt. [B-1373], spruce forest edge, on trees branches, 10.VIII.2012, 1♂; Malyi Breskul Mt. [MB-1405], subalpine tall grass communities with juniper bushes, on the stony slope, in grass, under stones, 13.VIII.2012, 1♀, coll. Gn.

Tallusia experta **(O. P.-Cambridge, 1871)**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Tsybul'nyk f.n. [Ts-1382], in sphagnum moss, 11.VIII.2012, 1♂; [Ts-1384], an area with green alder, willow and juniper bushes, between grasses, in moss, in rodent burrows, 11.VIII.2012, 3♀♀, coll. Gn.

Tapinocyba affinis **Lessert, 1907**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Bezimenna Mt. [B-1371], old-growth spruce forest, between blueberry branches, on the forest floor, and in moss, 10.VIII.2012, 3♂♂, 5♀♀, coll. Gn. Pozhyzhevs'ka Mt. [Poz-1358], spruce forest, in herpetobium, 23.VII.2014, 6♂♂, 1♀; Shuryn Mt. [Shur-1521] (Maricheika) old-growth spruce forest, in moss, 8.IX.2014, 2♂♂, 2♀♀, coll. H.

Taranucnus setosus **(O. P.-Cambridge, 1863)**
Published data. Pozhyzhevs'ka m.; Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).

Taranucnus **sp.**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Bezimenna Mt. [B-1441], spruce forest, in moss, club mosses, on stones and in the cavities between stones, 9.VIII.2012, 3♀♀; Malyi Breskul Mt. [MB-1405], subalpine tall grass communities with juniper bushes, on the stony slope, in grass, under stones, 13.VIII.2012, 2♀♀, coll. Gn.

Tenuiphantes alacris **(Blackwall, 1853)**
Published data. Hoverla Mt. (Balogh 1940: *Leptyphantes a.*). Luhy vil.; Menchyl' Mt. (Prokopenko & Chumak 2007). Petros Mt. (Chyzer & Kulczyński 1894: *Lephthyphantes a.*). Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Bezimenna Mt. [B-1369], old-growth spruce broken forest, the gentle slope with (*Vaccinium*) communities, on *forest floor,* and in moss, 10.VIII.2012, 3♂♂, 2♀♀; [B-1370], secondary spruce forest, in grass, in moss, on the forest floor, 10.VIII.2012, 2♀♀; [B-1371], old-growth spruce forest, between the blueberry branches, on the forest floor, in moss, 10.VIII.2012, 4♀♀; [B-1372], old-growth spruce broken forest, bank of a stream, on the stones, in moss, between grasses, 10.VIII.2012, 7♂♂, 12♀♀; [B-1373], spruce forest edge, on tree branches, 10.VIII.2012, 1♀; [B-1416] old-growth spruce forest, gravel bank of the dry mountain stream, between stones, 9.VIII.2012, 2♂♂, coll. Gn. [B-1400], spruce forest, in moss, club mosses, and in the cavities between stones, 10.VIII.2012, 5♂♂, 3♀♀, coll. Zh. [B-1441], spruce forest, in moss, club mosses, and between stones, 9.VIII.2012, 2♂♂, 11♀♀; coll. Gn. Dzhordzheva pryluka m. [DP-1023], mountain hay meadows, in dead grass remains, 16.VII.2013, 1♀, coll. H. Hoverla Mt. [H-1388], upper limit of the spruce forests, in moss under trees, 30.IX.2006, 1♀, coll. Zh. [H-1630], tall grass communities, bank of the stream, between stones, VII.2011, 1♀; Keveliv f.n. [Ke-690], bank of the riv. Keveliv, in moss, 22.VI.2012, 2♂♂, 2♀♀, coll. H. Malyi Breskul Mt. [MB-1339], old-growth spruce forest, between grasses, 11.VIII.2012, 1♀, coll. Zh. Shuryn Mt. [Shur-1521] (Maricheika), old-growth spruce forest, in moss, 8.IX.2014, 1♂, 1♀; Tsybul'nyk f.n. [Ts-1375], an area with (*Pinus mugo*) scrubs, on the forest floor, 6.IX.2014, 2♀♀, 1♂, coll. H.; [Ts-1385], same habitat, on the forest floor, between blueberry branches, 11.VIII.2012, 1♀, coll. Gn.

Tenuiphantes cristatus **(Menge, 1866)**
Published data. Petros Mt. (Chyzer & Kulczyński 1894, 1918: *Lephthyphantes c.*).

Material. Tsybul'nyk f.n. [Ts-1386], an area with spruces of different age on the edge of the bog, on the lower branches of trees, 11.VIII.2012, 1♀, coll. Gn.

Tenuiphantes mengei **(Kulczyński, 1887)**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007).
Material. Sheshul Mt. [Sh-1542], subalpine (*Juniperus*) thickets, in herpetobium, 14.VIII.2014, 1♀; Tsybul'nyk f.n. [Ts-1375], an area with (*Pinus mugo*) scrubs, on the forest floor, 6.IX.2014, 2♂♂, 1♀, coll. H.

Tenuiphantes tenebricola **(Wider, 1834)**
Published data. Hoverla Mt. (Balogh & Loksa 1947b: *Lepthyphantes t.*). Menchyl' Mt. (Prokopenko & Chumak 2007). Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Bezimenna Mt. [B-1347], spruce forest glades with (*Rumex*) communities, bank of the mountain stream, on the soil, and between sedges, 9.VIII.2012, 4♀♀; [B-1370], secondary spruce forest, in grass, in moss, on the forest floor, 10.VIII.2012, 2♀♀; [B-1371], old-growth spruce forest, between blueberry branches, on the forest floor, and in moss, 10.VIII.2012, 1♀; [B-1372], old-growth spruce broken forest, bank of a stream, on the stones, forest floor, in moss, and between grasses, 10.VIII.2012, 1♂, 4♀♀, coll. Gn. Dancer Mt. [D-1366], spruce forest, in herpetobium, 23.VII.2014, 3♀♀, coll. H. Hoverla Mt. [H-1327], bank of the riv. Prut, spruce forest, in grass, 10.VIII.2006, 1♀♀; [H-1393], upper limit of the spruce forests, (*Rumex*) communities, 10.VIII.2012, 1♂, 4♀♀; [H-1398], upper limit of the spruce forests, in moss, 11.VIII.2012, 1♂, coll. Zh. [H-1630], subalpine tall grass communities, bank of the mountain stream, between stones, VII.2011, 1♂; Kopytsia Mt. [Ko-1370], (*Vaccinium*) heaths, in dead grass remains 10.VII.2012, 4♂♂, 2♀♀, coll. H. Malyi Breskul Mt. [MB-1337], old-growth spruce forest, on the spider's web near treeroots, 11.VIII.2012, 1♀, [MB-1339], old-growth spruce forest, between grasses, 11.VIII.2012, 1♀, coll. Zh. Petros Mt. [P-1812], subalpine (*Juniperus*) thickets, in Icelandic moss, 26.VI.2012, 1♂, 8♀, coll. H. Pozhyzhevs'ka Mt. [Poz-1358], spruce forest, in herpetobium, 1♂, 5♀♀; [Poz-1521], green alder scrubs, in herpetobium, 26.VII.2014, 1♂; Sheshul Mt. [Sh-1542], subalpine (*Juniperus*) thickets, in herpetobium, 14.VIII.2014, 1♀; Tsybul'nyk f.n. [Ts-1375], an area with (*Pinus mugo*) scrub, in herpetobium, 26.VII.2014, 1♂, 1♀, coll. H. [Ts-1385], same habitat, on the forest floor, and between blueberry branches, 11.VIII.2012, 1♂, 4♀, coll. Gn.

Tenuiphantes tenuis **(Blackwall, 1852)**
Published data. Hoverla Mt. (Legotay 1974: *Leptyphantes t.*)

Thyreosthenius parasiticus **(Westring, 1851)**
Published data. Hoverla Mt. (Balogh & Loksa 1947a: *T. Becki* (Cambr.)).

Tiso vagans **(Blackwall, 1834)**
Material. Petros Mt. [P-1981], siliceous screes of the alpine level, under stones, 20.VI.2013, 1♂, coll. H.

Walckenaeria atrotibialis **(O. P.-Cambridge, 1878)**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Pip Ivan Mt. [PI-1681], (*Pinus mugo*) scrubs, in herpetobium, 7.IX.2014, 1♂; Pozhyzhevs'ka Mt. [Poz-1358], spruce forest, in herpetobium, 23.VII.2014, 1♂; Tsybul'nyk f.n. [Ts-1375], an area with (*Pinus mugo*) scrub, in herpetobium, 26.VII.2014, 1♀, 6.IX.2014, same habitat, 1♂, coll. H.

Walckenaeria cuspidata **Blackwall, 1833**
Published data. Hoverla Mt. (Balogh 1940: *Cornicularia c.*). Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Breskul Mt. [Bre-1900], alpigenous acidophilous grassland, (*Juncus trifidus*) communities, on juniper branches, 7.VIII.2012, 1♂, 1♀, coll. Zh. Petros Mt. [P-1981], siliceous screes, under stones, 20.VI.2013, 1♂; Pip Ivan Mt. [PI-1681], (*Pinus mugo*) scrubs, on the forest floor, 7.IX.2014, 1♂; Pozhyzhevs'ka Mt. [Poz-1358], spruce forest, in herpetobium, 6.IX.2014, 1♂, 1♀; Rogneska Mt. [Ro-1638], subalpine (*Juniperus*) thickets, on juniper branches, 26.VI.2012, 2♀♀; Shuryn Mt. [Shur-1521] (Maricheika) old-growth spruce forest, in moss, 8.IX.2014, 1♂, 1♀; Tsybul'nyk f.n. [Ts-1375], an area with (*Pinus mugo*) scrub, in herpetobium, 26.VII.2014, 1♀, coll. H. [Ts-1382], in sphagnum moss, 11.VIII.2012, 1♀; [Ts-1384], an area with green alder, willow and juniper bushes, between grasses, in moss, and in the rodent burrows, 11.VIII.2012, 7♀♀; [Ts-1385], an area with (*Pinus mugo*) scrubs, on the forest floor, between blueberry branches, 11.VIII.2012, 1♀; Turkul Mt. [Tu-1710], subalpine tall grass communities, an area with (*Pinus mugo*) and (*Rhododendron myrtifolium*), between grasses, 8.VIII.2012, 1♂, 1♀, coll. Gn.

Walckenaeria nudipalpis **(Westring, 1851)**
Material. Kizly f.n. [Ki-1740], peat shore of the Nesamovyte Lake, on the soil, between sedges, in moss, 8.VIII.2012, 1♀, coll. Gn.

Walckenaeria obtusa **Blackwall, 1836**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Petros Mt. [P-1981], siliceous screes, under stones, 20.VI.2013, 1♂; Sytnyi f.n. [Syt-1208], old-growth beech forest, on the forest floor, 13.VII.2013, 1♀, coll. H. Tsybul'nyk f.n. [Ts-1381], bank of a mountain stream, between sedges and grasses, 13.VIII.2012, 1♂, coll. Zh.

Liocranidae Simon, 1897
Apostenus fuscus **Westring, 1851**
Material. Chertizh f.n. [Che-999], beech forest edge, 16.VII.2013, 1♀; Sytnyi f.n. [Syt-1208], old-growth beech forest, on the forest floor, 13.VII.2013, 3♂♂, coll. H.

Lycosidae Sundevall, 1833
Acantholycosa lignaria **(Clerck 1757)**
Collections. Ardzheluzha f.n. [labelled: Czarna hora, Ardżeluża], 1♂, 2♀♀ (MiIZ, det. H).

?Alopecosa aculeata **(Clerck, 1757) /**
Alopecosa taeniata **(C. L. Koch, 1835)**
Published data. Petros Mt. (Chyzer & Kulczyński 1891: *Tarentula pulverulenta*, var. *a.*).

Alopecosa fabrilis **(Clerck, 1757)**
Published data. The Chornohora massif [Czarnogóra] (Wajgiel 1874: *Lycosa f.*).

Alopecosa pulverulenta **(Clerck, 1757)**
Published data. Hoverla Mt. (Balogh 1940: *Lycosa p.*). Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Collections. Dancer Mt. [labelled: Dancerz], 27.VII.1934, 1♀ (MPUWr, coll. et det. S. Pilawski).
Material. Hutyn Tomnatyk Mt. [HT-1925], alpine wet rock grooves with tall grass (*Festuca*) communities, in herpetobium, VI-VII.2012, 9♂♂, 2♀♀; Vesnarka m. [V-991], mountain hay meadows, in dead grass remains, 1.VII.1999, 1♂, coll. H.

Alopecosa taeniata **(C. L. Koch, 1835)**
Material. Pip Ivan Mt. [PI-1681], subalpine (*Pinus mugo*) scrubs, in herpetobium, 7.IX.2014, 1♀, coll. H.

Arctosa cinerea **(Fabricius, 1777)**
Published data. The Chornohora massif [Czarnogóra] (Wajgiel 1874: *A. allodroma* Walck.).
Material. Keveliv f.n. [Ke-690], gravel bank of the river Keveliv, between stones, 5.VII.1999, 1♀, coll. H.

Arctosa leopardus **(Sundevall 1833)**
Collections. Ardzheluzha f.n. [labelled: Czarna hora, Ardżeluża], 1♀ (MiIZ, det. H.).

Arctosa maculata **(Hahn, 1822)**
Published data. The Chornohora massif [Czarnogóra] (Wajgiel 1868: *Lycosa lynx* Hahn [misidentified], Wajgiel 1874: *A. cinerea* Sund. [misidentified]).
Collections. Valley of the riv. Prut [labelled: Dolina Prutu], 28.VII.1934, 2♀♀ (MPUWr, coll. et det. S. Pilawski).
Material. Kvasy vil. [Kv-545], gravel bank of the riv. Chorna Tysa, under stones, 22.VI.2012, 1♂, coll. H.

Aulonia albimana **(Walckenaer, 1805)**
Collections. Shpytsi Mt. [labelled: Szpyń], 27.VII.1934, 1♂ (MPUWr, coll. et det. S. Pilawski).
Material. Petros Mt. [P-1981], siliceous screes, under stones, VII.2011, 7♂♂, 2♀♀, coll. H.

Pardosa agrestis **(Westring, 1861)**
Published data. Menchul Kvasivs'kyi m. (Legotay 1974, Zyuzin 1981).
Material. Brebeneskul Mt. [Br-1900], the shallow stream, on the soil, 10.VIII.2012, 1♀, coll. Zh.

Pardosa agricola **(Thorell, 1856)**
Published data. Valley of the riv. Prut, Hoverlians'ke forestry (Legotay & Tarasyuk 1964: *Lycosa a.*).

Pardosa amentata **(Clerck, 1757)**
Published data. Hoverla Mt. (Chyzer & Kulczyński 1891: *Lycosa a.*; Balogh 1940). Luhy vil. (Prokopenko & Chumak 2007). Petros Mt. (Chyzer & Kulczyński 1891: *Lycosa a.*).
Collections. Ardzheluzha f.n. [labelled: Czarna hora, Ardżeluża], 3♀ (MiIZ, det. H.).
Material. Keveliv f.n. [Ke-690], bank of the riv. Keveliv, on the riparian plants, 22.VI.2012, 5♀♀; Kopytsia Mt. [Ko-1230], beech forest, bank of the mountain stream, under stones, 12.VII.2013, 1♀; Menchul Kvasivs'kyi m. [MKv-1240], (*Nardus stricta*) swards, in dead grass remains, 13.VIII.2014, 1♀; Petros Mt. [P-1981], siliceous screes, under stones, VII.2011, 1♀; Rogneska Mt. [Ro-1638], (*Juniperus*) thickets, on the forest floor, 26.VI.2012, 3♀♀; Sytnyi f.n. [Syt-1208], old-growth beech forest, on the forest floor, 13.VII.2013, 4♀♀, coll. H.

Pardosa blanda **(C. L. Koch, 1833)**
Published data. Menchul Kvasivs'kyi m. (Legotay 1974).

Pardosa ferruginea **(L. Koch, 1870)**
Published data. Hoverla Mt. (Chyzer & Kulczyński 1891, 1918: *Lycosa f.*).

Pardosa lugubris **(Walckenaer, 1802)**
Published data. Luhy vil.; Menchyl' Mt. (Prokopenko & Chumak 2007). Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Keveliv f.n. [Ke-690], bank of the riv. Keveliv, between river-side plants, 22.VI.2012, 1♀; Kopytsia Mt. [Ko-1050], raspberry bushes in the beech forest felling area, 1.VII.1999, 4♂♂; Kvasy vil. [Kv-545], gravel bank of the riv. Chorna Tysa, under stones, 1♀, 22.VI.2012, coll. H.

Pardosa monticola **(Clerck, 1757)**
Published data. Menchul Kvasivs'kyi m. (Legotay 1974, Zyuzin 1981).

Pardosa morosa **(L. Koch, 1870)**
Published data. Hoverla Mt. (Chyzer & Kulczyński 1891, 1918: *Lycosa m.*, Zyuzin 1981); Ozirnyi f.n. (Zyuzin 1981).

Pardosa nigra **(C. L. Koch, 1834)**
Published data. Petros Mt. (Zyuzin 1981).
Material. Hutyn Tomnatyk Mt. [HT-1925], alpine wet rock grooves with tall grass (*Festuca*) communities, in herpetobium, 5♂♂, 1♀, VI-VII.2012, coll. H.

Pardosa palustris **(Linnaeus, 1758)**
Published data. Hoverla Mt. (Balogh 1940: *P. tarsalis* (Thor.)).
Material. Hutyn Tomnatyk Mt. [HT-1925], alpine wet rock grooves with tall grass (*Festuca*) communities, in herpetobium, VI-VII.2012, 1♂, 1♀; Rogneska Mt. [Ro-1638], (*Juniperus*) thickets, on the forest floor, 26.VI.2012, 1♀, coll. H. Sheshul Mt. [Sh-1487], green alder scrubs, in moss, 2.VII.1999, 1♀, coll. H.

Pardosa pullata **(Clerck, 1757)**
Published data. Hoverla Mt. (Balogh 1940). Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Dzhordzheva pryluka m. [DP-1023], mountain hay meadows, in grass, 16.VII.2013, 2♀♀; Menchul Kvasivs'kyi m. [MKv-1191], mountain hay meadows, in dead grass remains, 9.VII.1999, 1♀; Kizly f.n. [Ki-1674], peat shore of the Nesamovyte Lake, on the soil, 24.VII.2014, 2♀♀; Rogneska Mt. [Ro-1638], (*Juniperus*) thickets, on the forest floor, 26.VI.2012, 1♀, coll. H. Tsybul'nyk f.n. [Ts-1374], an area with

(*Pinus mugo*) scrubs, on the sphagnum moss, 11.VIII.2012, 5♀♀, coll. Zh. [Ts-1375], same habitat, 26.VII.2014, 1♂, 1♀, coll. H.

***Pardosa riparia* (C. L. Koch, 1833)**
Published data. Petros Mt. (Chyzer & Kulczyński 1891, 1918: *Lycosa r.*). Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Munchel Mt. [Mu-1974], siliceous screes of the alpine level, entrenchments, under stones, 24.VII.2014, 1♀; Sytnyi m. [Sy-966], mountain hay meadows, on dead grass remains, 21.VI.2012, 2♀♀; Vesnarka m. [V-991], same habitat, 11.VII.2012, 3♀♀, coll. H.

***Pardosa saltuaria* (L. Koch, 1870)**
Published data. Hoverla Mt. (Chyzer & Kulczyński 1891: *Lycosa s.*, Baum 1929: *Lycosa s.*, Balogh 1940). Menchul Kvasivs'kyi m. (Zyuzin 1981). Petros Mt. (Chyzer & Kulczyński 1891: *Lycosa s.*, Zyuzin 1981). Pozhyzhevs'ka m.; Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007).
Collections. Hoverla Mt. [labelled: Czarna hóra, pod szczytem Howerli], 1♂, 3♀ (MiIZ, coll. Stobiecki, det. H.). Hoverla Mt.; Pozhyzhevs'ka Mt.; Zarosliak f.n. [labelled: Zaroślak, poł. Pożyżewska, Howerla], 1♀ (MiIZ, det. H.). Breskul Mt. [labelled: Breskuł], 28.VIII.1934, 1♀; Rozshybenyk mt. range [labelled: Rozszybenyk], 24.VIII.1934, 8♀; Shpytsi Mt. [labelled: Szpyń], 26.VIII.1934, 13♀ (MPUWr, coll. et det. S. Pilawski).
Material. Brebeneskul Mt. [Br-1900], shallow stream, on the soil, 10.VIII.2012, 1♀; [Br-2018], alpigenous acidophilous grassland, siliceous screes, on the soil, 9.VIII.2012, 1♀; Breskul Mt. [Bre-1594], (*Vaccinium*) heaths, under blueberry branches, 7.VIII.2012, 1♀, coll. Zh. Dzembronia Mt. [Dz-1836], alpigenous acidophilous grassland, under stones, 7.IX.2014, 1♀; Hutyn Tomnatyk Mt. [HT-1925], alpine wet rock grooves with tall grass (*Festuca*) communities, in herpetobium, VI-VII.2012, 10♂♂, 10♀♀, coll. H. Munchel Mt. [Mu-1988], [Mu-1992], [Mu-1991], [Mu-1943], alpigenous acidophilous grassland, between grasses and under stones, 10.VIII.2012, 4♀♀, coll. Zh. Petros Mt. [P-1981], siliceous screes, under stones, VII.2011, 1♀, 20.VIII.2014, same habitat, 8♂♂, 6♀♀; Petrosul Mt. [Pe-1810], alpigenous acidophilous grassland, (*Juncus trifidus*) communities, under stones, 20.VI.2013, 1♂, 5♀♀; Pip Ivan Mt. [PI-1681], (*Pinus mugo*) scrubs, on the forest floor, 7.IX.2014, 1♀; [PI-1985], siliceous screes, under stones, 7.IX.2014, 1♀; [PI-1995], same habitat, 7. IX.2014, 1♀; coll. H. Pozhyzhevs'ka m. [Po-1533], subalpine tall grass communities, in herpetobium, 26.VII.2014, 7♀♀, coll. H. Pozhyzhevs'ka Mt. [Poz-1747], alpigenous acidophilous grassland, (*Juncus trifidus*) communities, in grass, 7.VIII.2012, 1♀, coll. Zh. [Poz-1803], siliceous screes, under stones, 24.VII.2014, 1♀, coll. H. Rebra Mt. [R-1907], alpigenous acidophilous grassland, on the soil and under stones, 9.VIII.2012, 1♀ [R-1941], same habitat, 9.VIII.2012, 1♀, [R-1954], same habitat, 10.VIII.2012, 2♀♀, coll. Zh. Sheshul Mt. [Sh-1487], green alder scrubs, in moss, 2.VII.1999, 1♀; Turkul Mt. [Tu-1800], alpine wet rock grooves, between grasses, 24.VII.2014, 1♀, coll. H. Velyki Kizly Mt. [VK-1871], alpigenous acidophilous grassland, between grasses, 10.VIII.2012, 1♀, coll. Zh.

***Pardosa sordidata* (Thorell, 1875)**
Collections. Hoverla Mt.; Pozhyzhevs'ka Mt.; Zarosliak [labelled: Zaroślak, pol. Pożyżewska, Howerla], 1♀ (MiIZ, det. H.).

***Pirata piscatorius* (Clerck, 1757)**
Published data. Valley of the riv. Prut, forestry Hoverlians'ke (Legotay & Tarasyuk 1964).

***Piratula hygrophila* (Thorell, 1872)**
Published data. Hoverla Mt. (Balogh 1940: *Lycosa h.*). Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Rogneska Mt. [Ro-1638], subalpine (*Juniperus*) thickets, on juniper branches, 26.VI.2012, 4♀♀; Tsybul'nyk f.n. [Ts-1375], an area with (*Pinus mugo*) scrub, in herpetobium, 26.VII.2014, 1♀, coll. H.

***Piratula knorri* (Scopoli, 1763)**
Collections. Ardzheluzha f.n. [labelled: Czarna hora, Ardżeluża], 1♀ (MiIZ, det. H.).
Material. Keveliv f.n. [Ke-690], gravel bank of the riv. Keveliv, on the stones, 22.VI.2012, 3♀♀; Zarosliak f.n. [Z-1260], gravel bank of the riv. Prut on the stones, 28.VII.2014, 2♀♀, coll. H.

***Piratula latitans* (Blackwall, 1841)**
Published data. Hoverla Mt. (Balogh 1940: *Lycosa l.*).
Material. Brebeneskul Mt. [Br-1900], the shallow stream, on the soil, 10.VIII.2012, 1♀, coll. Zh.

***Trochosa ruricola* (De Geer, 1778)**
Published data. Hoverla Mt. (Legotay 1974).

***Trochosa spinipalpis* (F. O. P.-Cambridge, 1895)**
Published data. Valley of the riv. Prut, Hoverlians'ke forestry (Legotay & Tarasyuk 1964: *Pirata s.*).
Material. Tsybul'nyk f.n. [Ts-1375], an area with (*Pinus mugo*) scrub, in herpetobium, 6.IX.2014, 1♂, 1♀, coll. H.

***Trochosa terricola* Thorell, 1856**
Published data. Hoverla Mt. (Legotay 1974); Menchyl' Mt. (Prokopenko & Chumak 2007).
Material. Hoverla Mt. [H-1630], subalpine tall grass communities, bank of a mountain stream, between stones, VII.2011, 1♀; Kopytsia Mt. [Ko-1370], (*Vaccinium*) heaths, in moss, in in dead grass remains, 10.VII.2012, 8♀♀; Sheshul Mt. [Sh-1487], green alder scrubs, in moss, 2.VII.1999, 1♀; Sytnyi m. [Sy-966], mountain hay meadows, in dead grass remains, 30.VI.1999, 1♀; Sytnyi f.n. [Syt-1208], old-growth beech forest, on the forest floor, 13.VII.2013, 2♂♂; Vesnarka m. [V-1079], mountain hay meadows, in dead grass remains, 28.VI.2012, 1♂, coll. H.

***Xerolycosa nemoralis* (Westring, 1861)**
Published data. Menchyl' Mt. (Prokopenko & Chumak 2007).
Material. Petros Mt. [P-1996], siliceous screes of the alpine level, under stones, 20.VI.2013, 1♂, coll. H.

Miturgidae Simon, 1886
***Zora distincta* Kulczyński, 1915**
Published data. The Chornohora massif (Prószyński & Staręga 1971).

Zora nemoralis **(Blackwall, 1861)**
Material. Kopytsia Mt. [Ko-1370], (*Vaccinium*) heaths, in moss, in dead grass remains, 10.VII.2012, 3♀♀, coll. H.
Zora spinimana (Sundewall, 1833)
Material. Tsybul'nyk f.n. [Ts-1375], an area with (*Pinus mugo*) scrub, in herpetobium, 26.VII.2014, 1♂, 1♀, coll. H.

Philodromidae Thorell, 1870
Philodromus aureolus **(Clerck, 1757)**
Material. Sytnyi f.n. [Syt-1208], old-growth beech forest, on trees branches, 10.VII.2012, 1♂, coll. H.

Philodromus collinus **C. L. Koch, 1835**
Published data. Menchyl' Mt. (Prokopenko & Chumak 2007).
Material. Pozhyzhevs'ka Mt. [Poz-1358], spruce forest, in herpetobium, 6.IX.2014, 1♀; Shumneska m. [Shum-1315], bank of the riv. Shumneska, on spruce branches, 10.VII.2012, 1♀; Sytnyi f.n. [Syt-1208], old-growth beech forest, on trees branches, 10.VII.2012, 1♂; Tsybul'nyk f.n. [Ts-1375], an area with (*Pinus mugo*) scrub, in herpetobium, 6.IX.2014, 1♂, 2♀♀, coll. H.

Philodromus emarginatus **(Schrank, 1803)**
Published data. Petros Mt. (Chyzer & Kulczyński 1891).

Philodromus praedatus **O. P.-Cambridge, 1871**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007).

Philodromus vagulus **Simon, 1875**
Published data. Petros Mt. (Chyzer & Kulczyński 1891, 1918: *P. alpestris* L.Koch, 1876).

Pisauridae Simon, 1890
Dolomedes fimbriatus **(Clerck, 1757)**
Published data. The Chornohora massif [Czarnogóra] (Wajgiel 1874).

Pisaura mirabilis **(Clerck, 1757)**
Material. Sytnyi m. [Sy-890], mountain hay meadows, in grass, 13.VII.2013, 1♀, coll. H.

Salticidae Blackwall, 1841
Dendryphantes rudis **(Sundevall, 1833)**
Published data. Petros Mt. (Chyzer & Kulczyński 1891).

Euophrys frontalis **(Walckenaer, 1802)**
Material. Sytnyi m. [Sy-890], mountain hay meadows, on the foundations of a house, 10.VII.2012, 1♂, coll. H.

Evarcha falcata **(Clerck, 1757)**
Published data. Menchyl' Mt.; Tovstyi Hrun' f.n. (Prokopenko & Chumak 2007).
Material. Dzhordzheva pryluka m. [DP-1023], mountain hay meadows, in grass, 16.VII.2013, 2♂♂; Keveliv f.n. [Ke-690], bank of the riv. Keveliv, on the riparian plants, 5.VII.1999, 1♂; Kopytsia Mt. [Ko-1050], raspberry bushes in the beech forest felling area, 1.VII.1999, 1♀; Sytnyi m. [Sy-953], mountain hay meadows, in grass, 30.VI.1999, 2♀♀; [Sy-966] same habitat, 21.VI.2012, 1♂, 2♀♀, 8.VII.2014, same habitat, 1♂, coll. H. Tsybul'nyk f.n. [Ts-1364], on juniper branches, 11.VIII.2012, 1♀, coll. Zh. Vesnarka m. [V-991], mountain hay meadows, in grass, 11.VII.2012, 1♂, 2♀♀, coll. H.

Heliophanus flavipes **(Hahn, 1832)**
Material. Sytnyi m. [Sy-995], mountain hay meadows, in grass, 10.VII.2012, 1♀; Vesnarka m. [V-991], same habitat, 11.VII.2012, 2♀♀, coll. H.

Macaroeris nidicolens **(Walckenaer, 1802)**
Material. Kopytsia Mt. [Ko-1255], upper limit beech forests, subalpine (*Nardus stricta*) swards with intensive sheep grazing, VII.2012, 1♂, coll. H.

Pseudeuophrys erratica **(Walckenaer, 1826)**
Published data. Petros Mt. (Chyzer & Kulczyński 1891: *Euophrys e.*).

Salticus scenicus **(Clerck, 1757)**
Material. Menchul Kvasivs'kyi m. [MKv-1205], LNU field station, on the outside walls, 9.VII.1999, 1♀, coll. H.

Sitticus rupicola **(C. L. Koch, 1837)**
Published data. Hoverla Mt. (Balogh 1940); Petros Mt. (Chyzer & Kulczyński 1891: *Attus r.*).
Material. Breskul Mt. [Bre-1875], alpigenous acidophilous grassland, under stones, 7.VIII.2012, 1♀; Babyna Yama f.n. [BYa-942], spruce forest edge, under stones, 13.VIII.2012, 1♀, coll. Zh. Dancer Mt. (Orendarchyk) [D-1650], tall grass communities, bank of a mountain stream, under stones, 21.VII.2014, 1♂, 1♀; Keveliv f.n. [Ke-690], bank of the riv. Keveliv, under stones, 22.VI.2012, 1♂, coll. H. Pozhyzhevs'ka Mt. [Poz-1449], green alder scrubs, under stones, 1♀, 7.VIII.2012, coll. Zh. Shumneska m. [Shum-1315], bank of the riv. Shumneska, under stones, 9.VII.2012, 2♀♀; Turkul Mt. [Tu-1800], alpine wet rock grooves, under stones, 24.VII.2014, 1♀, coll. H.

Sitticus saxicola **(C. L. Koch, 1846)**
Published data. Luhy vil. (Prokopenko & Chumak 2007).

Sitticus terebratus **(Clerck, 1757)**
Material. Menchul Kvasivs'kyi m. [MKv-1205], LNU field station, on the outside walls, 15.VII.2013, 1♂, 1♀, 21.VII.2011, same habitat, 1♂, 2♀♀; Sytnyi m. [Sy-966], mountain hay meadows, on the foundation of house, 10.VII.2012, 1♂, coll. H.

Sparassidae Bertkau, 1872
Micrommata virescens **(Clerck, 1757)**
Published data. Pozhyzhevs'ka m. (Prokopenko & Chumak 2007).
Material. Sytnyi m. [Sy-966], mountain hay meadows, in grass, 8.VII.2014, 1♀, coll. H.

Segestriidae Simon, 1893
Segestria senoculata **(Linnaeus, 1758)**
Published data. Menchyl' Mt. (Prokopenko & Chumak 2007). Petros Mt. (Chyzer & Kulczyński 1897).
Material. Menchul Kvasivs'kyi m. [MKv-1205], LNU field station, on the outside walls, 17.VII.2013, 2♂♂; Petros Mt.

[P-1977], siliceous screes, under stones, 17.VII.2013, 1♂; [P-1981], 17.VII.2013, same habitat, 1♂, coll. H.

Tetragnathidae Menge, 1866
***Metellina mengei* (Blackwall, 1869)**
Material. Keveliv f.n. [Ke-690], bank of the riv. Keveliv, on the riparian plants, 22.VI.2012, 1♀, coll. H.

***Metellina merianae* (Scopoli, 1763)**
Material. Bezimenna Mt. [B-1400], spruce forest, in moss, club mosses, and in the cavities between stones, 10.VIII.2012, 1♀; Malyi Breskul Mt. [MB-1379], spruce forest edge, on the lower branches of trees, 11.VIII.2012, 1♀, coll. Zh.

***Metellina segmentata* (Clerck, 1757)**
Published data. Hoverla Mt. (Balogh 1940: *Meta s.*, Legotay 1974: *Meta s. s.*).
Material. Malyi Breskul Mt. [MB-1379], spruce forest edge, on the lower branches of trees, 11.VIII.2012, 1♀, coll. Zh.

***Pachygnatha degeeri* Sundevall, 1830**
Material. Tsybul'nyk f.n. [Ts-1374], subalpine active raised bog, in herpetobium, 26.VII.2014, 1♂, coll. H.

***Tetragnatha extensa* (Linnaeus, 1758)**
Material. Keveliv f.n. [Ke-690], bank of the riv. Keveliv, on the riparian plants, 22.VI.2012, 1♂, 1♀, coll. H.

***Tetragnatha montana* Simon, 1874**
Published data. The Chornohora massif [Czarnogóra] (Wajgiel 1874: *T. extensa* Walck.).

***Tetragnatha pinicola* L. Koch, 1870**
Published data. Hoverla m. (Legotay 1974).
Material. Hoverla Mt. [H-1630], bank of the mountain stream, on the riparian plants, VII.2011, 1♀; Keveliv f.n. [Ke-690], bank of the riv. Keveliv, on the riparian plants, 22.VI.2012, 3♀♀; Kopytsia Mt. [Ko-1050], raspberry bushes in the beech forest felling area, 1.VII.1999, 1♂, 2♀♂; Sytnyi m. [Sy-966], mountain hay meadows, in grass, 21.VI.2012, 3♀♀, coll. H.

Theridiidae Sundevall, 1833
***Asagena phalerata* (Panzer, 1801)**
Published data. Menchul Kvasivs'kyi m. (Legotay 1974).

***Enoplognatha ovata* (Clerck, 1757)**
Published data. Menchul Kvasivs'kyi m. (Legotay 1974: *Theridium o.*).
Material. Keveliv f.n. [Ke-690], bank of the riv. Keveliv, on the riparian plants, 5.VII.1999, 1♀; Sytnyi m. [Sy-996], beech forest edge, on trees branches, 10.VII.2012, 1♀; Vesnarka m. [V-991], mountain hay meadows, in grass, 11.VII.2012, 1♀, coll. H.

***Neottiura bimaculata* (Linnaeus, 1767)**
Material. Sheshul Mt. [Sh-1520], green alder scrubs, on bush branches, 14.VIII.2014, 1♀, coll. H.

***Ohlertidion ohlerti* (Thorell, 1870)**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007: *Theridion o.*).

Material. Pip Ivan Mt. [PI-1681], scrubs (*Pinus mugo*), on bush branches, 7.IX.2014, 2♀♀; Tsybul'nyk f.n. [Ts-1375], an area with scrubs (*Pinus mugo*), on bush branches, 1♀, 26.VII.2014, coll. H.

***Paidiscura pallens* (Blackwall, 1834)**
Published data. Menchyl' Mt.; Pozhyzhevs'ka Mt.; Pozhyzhevs'ka m. (Prokopenko & Chumak 2007).

***Parasteatoda simulans* (Thorell, 1875)**
Material. Menchul Kvasivs'kyi m. [MKv-1216], upper limit beech forests, on trees branches, 3.VII.1999, 2♀♀, coll. H.

***Parasteatoda tabulata* (Levi, 1980)**
Material. Kvasy vil. [Kv-699], on a wooden fence, 17.VII.2013, 1♀, coll. H.

***Pholcomma gibbum* (Westring, 1851)**
Published data. Hoverla Mt. (Legotay 1974).

***Phylloneta impressa* (L. Koch, 1881)**
Published data. Koz'meshchyk f.n. (Legotay 1974: *Theridium i.*; juv). Luhy vil.; Pozhyzhevs'ka m. (Prokopenko & Chumak 2007: *Theridion i.*).
Material. Dzhordzheva pryluka m. [DP-1023], mountain hay meadows, in grass, 4.VII.2012, 1♂; Keveliv f.n. [Ke-690], bank of the riv. Keveliv, on the riparian plants, 5.VII.1999, 1♀; H. Sytnyi m. [Sy-995], mountain hay meadows, in grass, 10.VII.2012, 2♂♂; Vesnarka m. [V-991], same habitat, 1.VII.1999, 1♀; [V-1079], same habitat, 28.VI.2012, 2♂♂, coll. H.

***Phylloneta sisyphia* (Clerck, 1757)**
Published data. Petros Mt. (Chyzer & Kulczyński 1894: *Theridium s.*).
Material. Kopytsia Mt. [Ko-1230], beech forest, bank of a mountain stream, under stones, 12.VII.2013, 1♀, coll. H. Pozhyzhevs'ka m. [Po-1390], (*Vaccinium*) heaths, on the blueberry bushes, 8.VIII.2012, 3♀♀, coll. Zh.; [Po-1406], tall grass communities, on the inflorescences of grasses, 25.VII.2014, 1♀; Rogneska Mt. [Ro-1638], subalpine (*Juniperus*) thickets, on juniper branches, 26.VI.2012, 1♂; Sheshul Mt. [Sh-1367], (*Vaccinium*) heaths, on the inflorescences of mat-grass, 14.VIII.2014, 1♀; Sytnyi m. [Sy-966], mountain hay meadow, in grass, 2.VII.1999, 1♀, coll. H.

***Platnickina tincta* (Walckenaer, 1802)**
Published data. Menchul Kvasivs'kyi m. (Legotay 1974: *Theridium t.*).

***Robertus arundineti* (O. P.-Cambridge, 1871)**
Published data. Pozhyzhevs'ka m. (Prokopenko & Chumak 2007).

***Robertus lividus* (Blackwall, 1836)**
Published data. Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Pozhyzhevs'ka m. [Po-1533], subalpine tall grass communities, in herpetobium, 26.VII.2014, 3♂♂, 3♀♀; Pozhyzhevs'ka Mt. [Poz-1358], spruce forest, in herpetobium, 23.VII.2014, 1♂; Rogneska Mt. [Ro-1638],

(*Juniperus*) thickets, on the forest floor, 26.VI.2012, 5♀♀; Shuryn Mt. (Maricheika) [Shur-1521], old-growth spruce forest, in moss, 8.IX.2014, 1♂, 1♀; Sytnyi f.n. [Syt-1208], old-growth beech forest, on the forest floor, 13.VII.2013, 3♀♀, coll. H.

***Robertus neglectus* (O. P.-Cambridge, 1871)**
Published data. Menchyl' Mt. (Prokopenko & Chumak 2007).

***Robertus scoticus* Jackson, 1914**
Material. Dancer Mt. [D-1366], spruce forest, on the forest floor, 6.IX.2014, 2♀♀; Kizly f.n. [Ki-1539], (*Pinus mugo*) scrubs, on the forest floor, 24.VII.2014, 1♀; Pip Ivan Mt. [PI-1681], same habitat, 7.IX.2014, 1♀; Sheshul Mt. subalpine (*Vaccinium*) heaths, on the forest floor, 8.VII.2014, 1♂; Tsybul'nyk f.n. [Ts-1375], an area with (*Pinus mugo*) scrub, in *Sphagnum* moss, 6.IX.2014, 1♂, coll. H.

***Robertus truncorum* (L. Koch, 1872)**
Published data. Menchyl' Mt.; Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007).

***Rugathodes bellicosus* (Simon, 1873)**
Material. Malyi Breskul Mt. [MB-1635], siliceous screes, under stones, 23.VII.2014, 1♀, coll. H.

***Steatoda bipunctata* (Linnaeus, 1758)**
Material. Menchul Kvasivs'kyi m. [MKv-1205], LNU field station, in the building, 15.VII.2013, 1♀; Pozhyzhevs'ka m. [Po-1427], IEC field station, in the building, 1♀, 21.VII.2014, coll. H.

***Theridion pictum* (Walckenaer, 1802)**
Material. Sytnyi m. [Sy-953], mountain hay meadows, in grass, 30.VI.1999, 1♀, coll. H.

***Theridion varians* Hahn, 1833**
Published data. Petros Mt. (Chyzer & Kulczyński 1894: *Theridium v.*).
Material. Menchul Kvasivs'kyi m. [MKv-1216], upper limit beech forests, on trees branches, 3.VII.1999, 1♀; Pozhyzhevs'ka m. [Po-1372], tall grass communities, on the inflorescences of grasses, 25.VII.2014, 1♀; Sytnyi m. [Sy-953], mountain hay meadows, in grass, 30.VI.1999, 1♀, coll. H.

Thomisidae Sundevall, 1833
***Diaea dorsata* (Fabricius, 1777)**
Material. Sytnyi m. [Sy-953], hay meadows, between blueberry branches, 30.VI.1999, 1♀, coll. H.

***Ebrechtella tricuspidata* (Fabricius, 1775)**
Published data. Koz'meshchyk f.n. (Legotay 1974: *Misumenops t.*).

***Misumena vatia* (Clerck, 1757)**
Published data. Koz'meshchyk f.n. (Legotay 1974).
Material. Sytnyi m. [Sy-995], mountain hay meadows, in grass, 10.VII.2012, 1♀; [Sy-966], same habitat, 8.VII.2014, 1♂; Vesnarka m. [V-991], same habitat, 1.VII.1999, 1♂, 1♀, coll. H.

***Ozyptila trux* (Blackwall, 1846)**
Published data. Hoverla Mt. (Balogh 1940: *Oxyptila t.*). Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007, Chumak et al. 2007).
Material. Hutyn Tomnatyk Mt. [HT-1925], alpine wet rock grooves with tall grass (*Festuca*) communities, in herpetobium, VI-VII.2012, 2♂♂; Sheshul Mt. [Sh-1367], subalpine (*Vaccinium*) heaths, in herpetobium, 14.VIII.2014, 1♀, coll. H.

***Xysticus acerbus* Thorell, 1872**
Published data. Hoverla Mt. (Legotay 1974).

***Xysticus audax* (Schrank, 1803)**
Published data. Hoverla Mt. (Legotay 1974); Petros Mt. (Chyzer & Kulczyński 1891: *X. pini*).

***Xysticus bifasciatus* C. L. Koch, 1837**
Published data. Hoverla Mt. (Chyzer & Kulczyński 1891). Pozhyzhevs'ka Mt. (Prokopenko & Chumak 2007).
Material. Sytnyi m. [Sy-995], mountain hay meadows, in grass, 10.VII.2012, 1♀, coll. H.

***Xysticus cristatus* (Clerck, 1757)**
Material. Sytnyi m. [Sy-966], mountain hay meadows, in grass, 21.VI.2012, 1♀, coll. H.

***Xysticus erraticus* (Blackwall, 1834)**
Material. Dzhordzheva pryluka m. [DP-1023], mountain hay meadows, in grass, 4.VII.2012, 1♂; Vesnarka m. [V-991], same habitat, 1.VII.1999, 1♂, coll. H.

***Xysticus kochi* Thorell, 1872**
Published data. Hoverla Mt.; Koz'meshchyk f.n. (Legotay 1974). Menchyl' Mt. (Prokopenko & Chumak 2007).

***Xysticus lanio* C. L. Koch, 1835**
Material. Kopytsia Mt. [Ko-1050], raspberry bushes in the beech forest felling area, 1.VII.1999, 1♀, coll. H.

***Xysticus obscurus* Collett, 1877**
Material. Hutyn Tomnatyk Mt. [HT-1925], alpine wet rock grooves with tall grass (*Festuca*) communities, in herpetobium, VI-VII.2012, 3♂♂, coll. H. Kedruvatyi Pohorilets' mt. spur [KP-1980], alpigenous acidophilous grassland, (*Festuca*) communities, under stones, 9.VIII.2012, 2♀♀, coll. Zh. Munchel Mt. [Mu-1974], alpigenous acidophilous grassland, in grass, 24.VII.2014, 1♂, coll. H.

***Xysticus striatipes* L. Koch, 1870**
Published data. Koz'meshchyk f.n. (Legotay 1974).

***Xysticus ulmi* (Hahn, 1831)**
Published data. The Chornohora massif [Czarnogóra] (Wajgiel 1874: *X. palustris* LK.). Koz'meshchyk f.n. (Baum 1930).
Material. Vesnarka m. [V-991], mountain hay meadows, in grass, 1.VII.1999, 1♂, coll. H.

Discussion
The spider fauna of the Chornohora massif includes 252 species (22 families), representing 23.6 % of all species known for the Carpathian Mountains (Gajdoš et al. 2014).

Among the 22 families, the richest one is Linyphiidae (97 species, 38.5 % of the total number of species). Other species-rich families are: Lycosidae (30 species, 11.9 %), Araneidae (22 species, 8.7 %), Theridiidae (20 species, 7.9 %), Thomisidae (14 species, 5.6 %), Gnaphosidae (10 species, 4.0 %), Salticidae (10 species, 4.0 %) and Clubionidae (9 species, 3.6 %).

The spider fauna of the studied massif includes a number of endemic Carpathian species: *Incestophantes annulatus*, *Kaestneria torrentum*, *Lessertinella carpatica*, *Palliduphantes milleri*, *Zora distincta* and *Cryphoeca carpathica*. Among the 186 species listed in the Draft of the Carpathian Red List, developed on the basis of an analysis of the fauna in seven countries (category VU, EN, CR, RE; Gajdoš et al. 2014), eleven species were found in the studied territory: *Oblertidion oblerti* – VU, *Erigone tirolensis* – EN, *Hilaira excisa* – VU, *Incestophantes annulatus* – VU, *Lessertinella carpatica* – EN, *Mansuphantes arciger* – VU, *Mecynargus morulus* – EN, *Oreoneta tatrica* – EN, *Palliduphantes milleri* – VU, *Pocadicnemis carpatica* – VU and *Xysticus obscurus* – VU. Another four: *Centromerus silvicola* – VU, *Araneus nordmanni* – VU, *Alopecosa fabrilis* – VU, *Zora distincta* – EN are known only from the literature. Thus, the proportion of species with protected status on this territory is 3.9 %, which is large compared to other regions of the Ukrainian Carpathians.

The present work reflects the distribution of spider species in specific types of highland habitats, especially the spruce and beech forests, the mountain hay meadows, the subalpine swards (*Nardus stricta*), the green alder scrubs, the scrub (*Pinus mugo*), the subalpine (*Vaccinium*) and alpenrose heaths (*Rhododendron myrtifolium*), the alpigene tall grass communities, the alpigenous acidophilous grasslands, moss and lichen dominated mountain summits, the alpine wet rock grooves, the siliceous screes of the alpine and subalpine level, and banks of mountain streams. The subalpine active raised bogs (field names Tsybulnyk and Kizly) are endangered areas in the Ukrainian Carpathians. Therefore, the annotated list of spiders of the Chornohora massif could form a basis for prospective ecological research and analysis of the fauna of this region based on the principles of habitat concept of biodiversity protection.

Further study of spiders of the Chornohora massif should be directed towards an investigation of the lower montane zone, especially of the beech, beech-fir, beech-fir-spruce forests, and their secondary ecosystems. Particular attention should be paid to a study of spider communities of the glacial cirques as centers of biodiversity in the Carpathian region.

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Резюме (UA). Контрольний список павуків гірського масиву Чорногора (Українські Карпати).

Анотований список павуків масиву Чорногора (Українські Карпати) створено на підставі літературних даних і зборів авторів 1999, 2006, 2011-2014 років. Дослідження проведено здебільшого у верхньому лісовому, субальпійському та альпійському поясах на схилах гір головного хребта і прилеглих до нього відног і гір. Охоплено також деякі урочища в льодовикових карах і долинах рік, поодиноко матеріал зібраний у межах населених пунктів. До переліку уключено матеріали колекції Природничого Музею Вроцлавського університету та Музею і інституту Зоології ПАН у Варшаві. Видовий склад фауни Чорногори, відповідно до списку налічує 252 види, що належать до 22 родин.

Ключові слова: *фауна, Україна, Карпати.*

Editors' note

After typesetting the editors wondered about the term “herpetobium”, which we found frequently used in the area of the former Sovjet Union. Klemm (1929) introduced it in Germany and mentions its origin from professor Dogiel, Russia/SU. But we could not find any Russian publication, which introduces it. Herpetobium means in fact “epigeic active” and belongs to this set of terms: Geobium, Herpetobium, Bryobium, Phyllobium, Anthobium, Aerobium.

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Cave survey yields a new spider family record for Israel

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Abstract. Leptonetidae and Phyxelididae were discovered as part of the first thorough cave survey of arthropods in Israel, and are reported here for the first time from caves in Israel. Both families were found in relatively temperate and humid caves at the western part of Israel and in intermediate elevation, at the cave entrance and the twilight zone. Leptonetidae were recorded for the first time in Israel.

Keywords: Araneae, *Cataleptoneta*, Leptonetidae, Levant, *Phyxelida*, Phyxelididae, troglophiles

Cave dwelling species can be classified into three groups, according to their affinity to life in caves: troglobites are obligatory cave species, and therefore usually have morphological adaptations such as reduction or complete loss of vision and pigmentation as well as elongation of the appendages; troglophiles (which can be divided into eutroglophile and subtroglophile, see Sket 2008) are species that have a strong affinity to caves but can also live outside caves, and therefore lack these morphological adaptations. A third group of cave dwellers are the trogloxenes, species that live in caves but are required to leave the cave periodically for various needs (Trajano 2005, Sket 2008). Spiders include nearly 1000 true troglobite species, and many more species are troglophiles and can be found at the entrances of caves (Reddell 2005, Romero 2009).

Leptonetidae Simon, 1890, is one example of a spider family with both troglobite and troglophile species (Ledford 2004, Jocqué & Dippenaar-Schoeman 2006, Ledford et al. 2011). Leptonetids are small six-eyed haplogyne spiders that construct sheetwebs. Thirteen of the 22 recognized leptonetid genera have a Palearctic distribution, and many of the species are associated with caves (Deltshev 1985, Ledford 2004, Jocqué & Dippenaar-Schoeman 2006, Ledford et al. 2011, Deltshev et al. 2014, World Spider Catalog 2015). Phyxelididae Lehtinen, 1967 is mainly an Afrotropical family of small-medium cribellate eight-eyed spiders. Species belonging to this family build tangled webs or sheetwebs and many of the 14 known genera are found in dark places (Griswold 1990, Jocqué & Dippenaar-Schoeman 2006). Of the 272 leptonetid species and the 64 phyxelidid species known worldwide only one of each of these families was previously recorded from the Levant sensu stricto (World Spider Catalog 2015). *Cataleptoneta edentula* Denis, 1955 was described from a cave in Lebanon (Denis 1955) and *Phyxelida anatolica* Griswold, 1990 was described from a cave in Southern Turkey (close to Syria) and was later recorded under stones in a pine forest in the Cyprus mountains (Griswold 1990, Thaler & Knoflach 1998, World Spider Catalog 2015).

The Levant is a historical and geographical term used for the lands at the eastern edge of the Mediterranean Sea (Por 1975), and as such, has many definitions of its specific limits. Here we use the Levant 'sensu stricto', namely the island of Cyprus and the mainland area including Israel, Jordan, Lebanon, Palestine and Syria. The Levant mainland is, as a unit, unusually heterogeneous topographically, climatically and biologically. It includes four main topographic elements, each element continues from the north to the south: the coastal plain, the western mountain ridge, the rift valley and the eastern mountain ridge. The topographic and climatic heterogeneity can be explained by geological processes and the crossing of horizontal zonal climatic belts by these four topographic elements (Por 1975, Danin 1988). Israel has se-

Fig. 1: Geographic-topographic representation of the surveyed sites. Locality of Leptonetidae marked with a circle, localities of Phyxelididae marked with squares, all other sampling localities marked with triangles. Caves with specific environmental records (33) marked in yellow/light grey, other sites (22) marked in purple/dark grey (adapted from Aharon 2015, based on Eric Gaba – http://commons.wikimedia.org/wiki/User:Sting)

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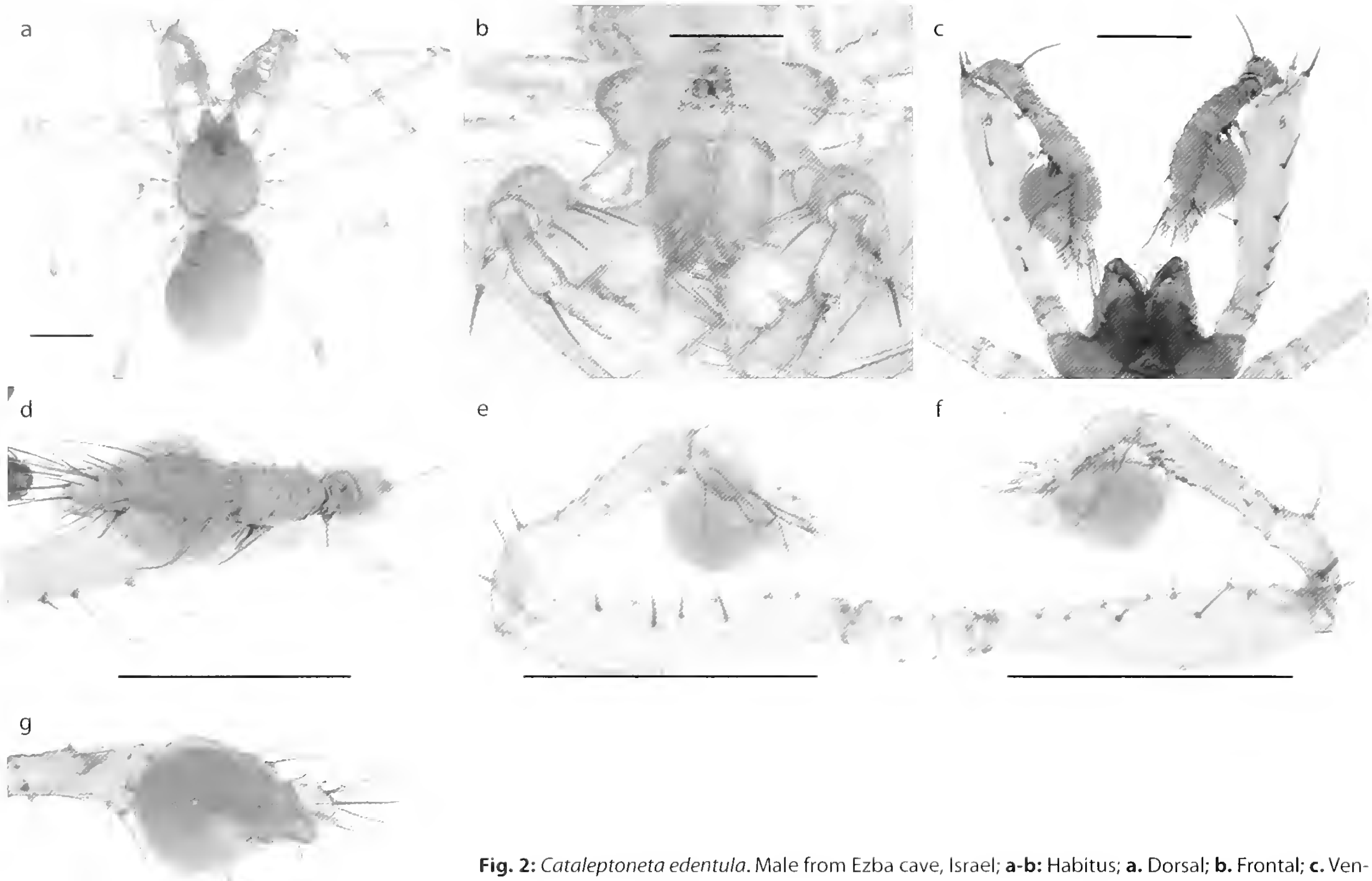

Fig. 2: *Cataleptoneta edentula*. Male from Ezba cave, Israel; **a-b:** Habitus; **a.** Dorsal; **b.** Frontal; **c.** Ventral, chelicerae and pedipalps; **d-g:** Left pedipalp; **d.** Dorsal; **e.** Mesal; **f.** Ectal; **g.** Ventral; Scales 0.5 mm

veral climatic, phytogeographical and zoogeographical zones, as a result of its location on a biogeographical crossroads (Por 1975, Yom-Tov & Tchernov 1988). The three zoogeographical regions that are used for terrestrial animals in Israel are: Palearctic, Palaeoeremic, and Ethiopian, in addition to the Oriental zoogeographical element that has no specific geographical affinity (Por 1975). The Palearctic zoogeographical region includes northern Galilee and is the most widespread zoogeographical element in the Levant. The Palaeoeremic zoogeographical region includes the Negev desert as well as the Jordan valley and the Arava valley. South of the Jezreel Valley, in the north of Israel, and north of the Negev desert are transition zones that includes both Palearctic and Palaeoeremic elements, while the Ethiopian zoogeographical region includes mainly the Jordan valley, the Arava valley, and the coastal plain (Por 1975). Our cave survey aimed at recording the arachnid cave fauna from all of the zoogeographical zones of Israel.

Study sites, material and methods

Between September 2013 and June 2014 we sampled in more than 40 caves in the three zoogeographical regions of Israel: Ethiopian (Jordan Rift valley and Dead Sea valley), Palaeoeremic (Negev desert including the Arava valley) and Palearctic (central and northern Israel including the western mountain ridge (upper Galilee and Judean mountains). The survey was conducted in three different seasons: late summer to autumn, spring, and late spring to early summer. In 33 of the caves we collected arachnids by means of pitfall-traps (with NaCl solution, left in caves for 74-77 days) and hand collecting (with flashlights and UV light); in the rest of the caves only hand collecting was used. Spider collection in nature reserves was conducted under a permit by the Nature and Parks Authorities (No. 2014/40313 for Efrat Gavish-Regev). For the 33 caves (above), spiders were collected at the cave entrance, the intermediate part of the cave (twilight zone) and the dark zone, when it was applicable (some caves were short and did not contain twilight and dark zones). In addition we recorded the physical and climatic attributes of each cave such as length, opening size, elevation, geology, precipitation, temperature, humidity and luminance. Temperature measurements were taken using PicoLite 16-K, a single-trip USB Temperature Logger (FOURTEC), measuring the temperature once an hour during 74-77 days. Illumination was recorded at the time of sampling using an ExTech 401025 Lux light meter. Localities are marked on Fig. 1, and transliterated names of the localities follow the "Israel Touring Map" (1:250,000) and "List of Settlements," published by the Israel Survey, Ministry of Labour. Geographic coordinates are given in WGS84. Elevation, precipitation, and geological data were provided by the GIS (Geographic Information System) center, The Hebrew University of Jerusalem. All specimens collected were transferred into 75 % ethanol. Specimens were examined and illustrated using a Nikon SMZ 25 stereomicroscope, and identified to species when possible using taxonomic literature (Nentwig et al. 2015, World Spider Catalog 2015). Female genitalia were cleared using a 10 % KOH solution. Photographs were taken using NIS-Elements D (Nikon 2015 version 420). Multi-layer pictures were combined using Zerene Stacker (Version 1.04), and edited using GIMP ver. 2.6.10 and Inkscape ver. 0.48. Left structures (pedipalps) are illustrated unless otherwise stated.

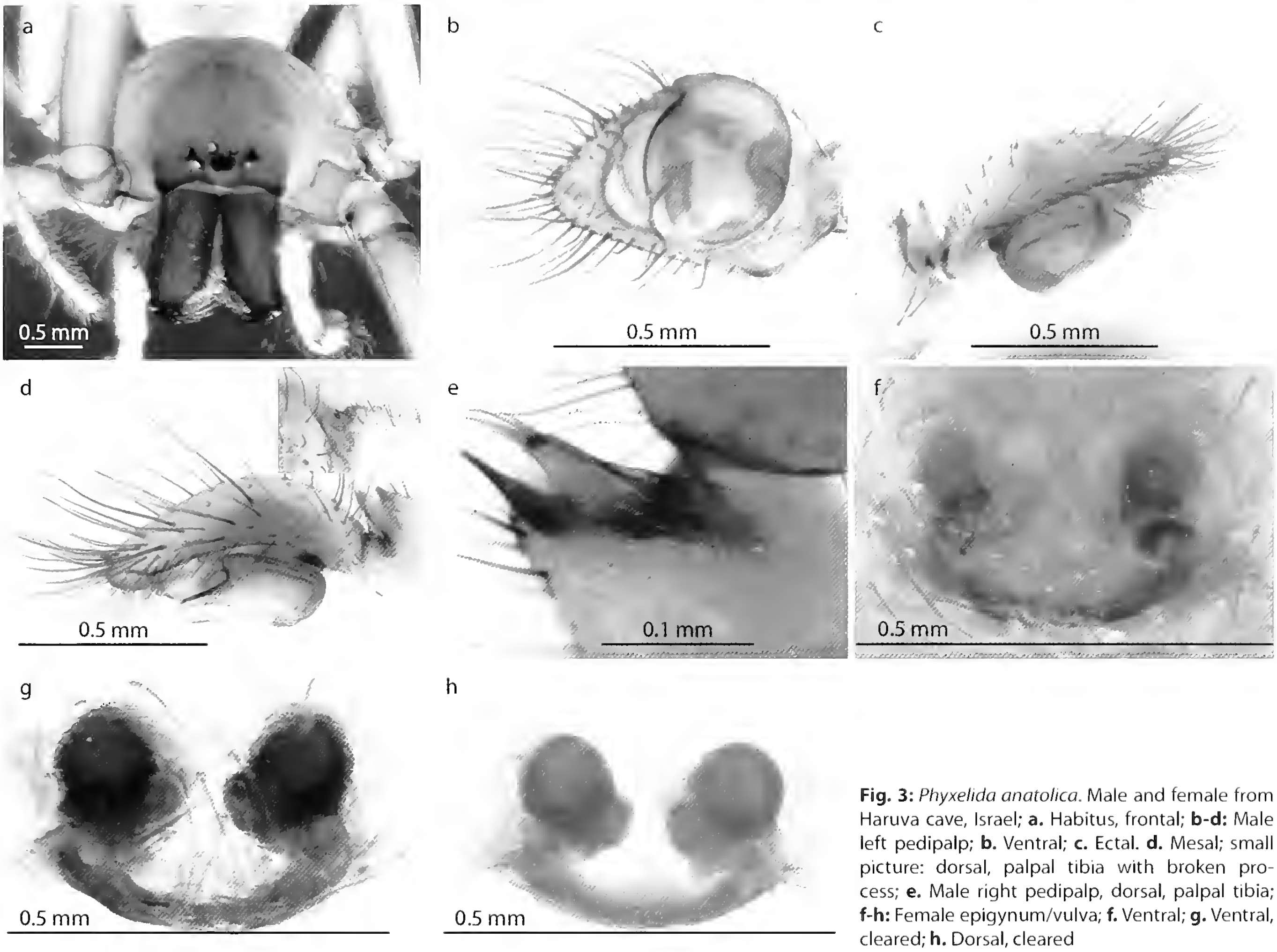

Fig. 3: *Phyxelida anatolica*. Male and female from Haruva cave, Israel; **a.** Habitus, frontal; **b-d:** Male left pedipalp; **b.** Ventral; **c.** Ectal. **d.** Mesal; small picture: dorsal, palpal tibia with broken process; **e.** Male right pedipalp, dorsal, palpal tibia; **f-h:** Female epigynum/vulva; **f.** Ventral; **g.** Ventral, cleared; **h.** Dorsal, cleared

Results

As part of this cave survey we collected one male belonging to the troglophile family Leptonetidae, and more than ten individuals, including an adult male and several females, belonging to the Afrotropical family Phyxelididae (see Fig. 1 for all caves surveyed, and for localities of new records). The overall ranges of elevation, temperature and precipitation (March-June) for all 33 caves, where measurements were taken, included large part of the range found in Israel: -380 to 773 m a.s.l., 7-32 °C and 50-850 mm (March-June), respectively. Yet Leptonetidae and Phyxelididae were found in Israel only in rather temperate caves, with precipitation above 500 mm (details are given below).

Leptonetidae. We found only one male belonging to this troglophile family in the entrance of Ezba cave (32.7118°N, 34.9747°E) on March 13th, 2014. This is a large and rather temperate cave, with a temperature of 14.5 -20 °C (entrance minimum-maximum; March-June 2014). The cave is situated in the Karmel mountain in the north-west of Israel, 120 meter a.s.l., and with yearly average of 650 mm precipitation. The leptonetid spider found in Ezba cave (Fig. 2) belongs to the genus *Cataleptoneta* Denis, 1955, and to the type species of the genus *Cataleptoneta edentula* Denis, 1955, described from a cave in Lebanon and reported thus far only from Lebanon. The spider family Leptonetidae is recorded for the first time in Israel.

Phyxelididae. We found twelve individuals, including three adults (one male and two females) belonging to this Afrotropical family. The specimens were recorded from Haruva cave (31.9133°N, 34.9607°E), as well as from Suseya cave in the West Bank (31.4061°N, 35.1033°E), on March 9th, March 31st, and on August 1st 2014, respectively. Haruva is a large and rather temperate cave, with a temperature of 14.5 - 19.5 °C (entrance minimum-maximum; March-June 2014) and 16 - 19.5 °C (twilight zone minimum-maximum; March-June 2014). Haruva cave is situated in the Judean lowlands in the centre of Israel, 180 meter a.s.l., and with yearly average of 500 mm precipitation. The cave of Suseya is situated in the southern Hebron mountains, part of the Judaean mountains, between the Judean and Negev deserts, at 773 meter a.s.l., and with yearly average of 250 mm precipitation; we did not measure temperatures and illumination in this cave. Although the cave of Suseya is situated in an arid region, the vegetation found in this area, namely semi-steppe batha, includes Mediterranean plants which dominate bathas in more mesic, northern parts of Israel (Danin 2015). This suggests better climatic conditions that can enable the existence of spiders with Palearctic affinities. The phyxelidid spiders found in these caves (Fig. 3) belong to the genus *Phyxelida* Simon, 1894, and to the species *Phyxelida anatolica* Griswold, 1990, described from a cave in southern Turkey, close to Syria, and later reported from Cyprus mountain pine forests (Thaler & Knoflach 1998).

Discussion

Despite more than 35 years of active taxonomical research in arachnology (Lubin & Gavish-Regev 2009, Zonstein & Marusik 2013), it is still common to find new records of known spider species for Israel, and species new to science here. It is less common to find new records of spider families (but see Levy 2003: Anyphaenidae and Hahniidae, Marusik & Zonstein 2011: Synaphridae, and Zonstein et al. 2015: Mysmenidae and Phyxelididae, see below).

Both new family records are known from the Levant sensu stricto: Leptonetidae was reported from Lebanon, and Phyxelididae from Cyprus and southern Turkey not far from northern Israel, where our new records were found. After submitting this short-communication for publication, Phyxelididae was reported from Mount Meron in the upper Galilee and from the Karmel mountain ridge Israel in a paper by Zonstein et al. (2015). Due to the morphological resemblance of the new records from Israel to the known species from the Levant and the localities where they were found in Israel, the recorded species were assigned to the species known from Lebanon and Cyprus and Turkey.

Cataleptoneta edentula, though not presenting any morphological adaptation to life in caves, was recorded thus far only from two caves: the type locality cave in Lebanon and Ezba cave in Israel.

Phyxelida anatolica is the northernmost representative of *Phyxelida*, and was suggested to be restricted to caves (Griswold 1990), however Thaler & Knoflach (1998) suggested it is a hygrophilic or "refugial-cavatic" species, as it was found under stones in pine forest in the Cyprus mountains. Zonstein et al. (2015) recently reported one male and one female, but did not give details of the habitat where the specimens were collected, and stated that the two specimen records are the easternmost and southernmost localities of this species. Here we report two localities that are further south than the previous localities: Haruva cave (31.9133°N, 34.9607°E) and Suseya cave (31.4061°N, 35.1033°E).

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Catching of spiders in shallow subterranean habitats in the Czech Republic

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Abstract. Spiders occurring in soils and fissured rocks were investigated using pipe traps. Four microphthalmic species, namely *Hahnia microphthalma*, *Porrhomma egeria*, *P. microps* and *P. cambridgei* were collected. *Hahnia microphthalma* is reported from the Czech Republic for the first time. The importance of collecting material by complex pipe traps (consisting of a perforated pipe and a set of removable cups) to record the depth distribution of spiders in subterranean habitats is stressed. The importance of the soil and fissure network formed by sandy marlite bedrock and of alluvial soils for the life of subterranean spiders is documented.

Keywords: alluvial soil, microphthalmy, pipe traps, sandy marlite, troglomorphism

For humans, caves are more accessible than other subterranean habitats. Much of what we know about subterranean biology comes from the study of caves, partly because of the adventure and excitement of visiting and exploring caves, which are certainly more exciting than visiting, for example, talus slopes (Culver & Pipan 2009). Terrestrial shallow subterranean habitats are formed in soil, rock mantle formed in bare and forest scree, slope and alluvial sediments and in fissured rock and cave entrances (Culver & Pipan 2014). A depth of about 10 m represents the natural border between shallow and deep subterranean habitats (Novak et al. 2012, Růžička et al. 2013). Our knowledge concerning invertebrates that live only several metres under the surface is very limited.

Many subterranean invertebrates display similar morphologies that have evolved convergently under similar selective pressures imposed by the subterranean environment. Subterranean spiders show typical morphological changes known as troglomorphisms: depigmentation, microphthalmy and lengthening of the legs (Culver & Pipan 2009).

Arachnological research into shallow subterranean habitats has a long tradition in the Czech Republic. Independently of Juberthie & Delay (1981), Růžička (1982) started to investigate invertebrates living in talus slopes using board traps. Numerous surprising findings have been reported since, including five taxa new to science, and twelve species of arthropods new to the Czech Republic (Růžička & Klimeš 2005). *Wubanoides uralensis* (Pakhorukov, 1981) (respectively *Wubanoides uralensis lithodytes* Schikora, 2004), was recorded for the first time in Europe and several troglomorphic populations/taxa have been described (Růžička 1988a, 1998, 2011). His research has documented that freezing talus slopes represent a classic example of a palaeorefugium that significantly contributes to the protection and maintenance of regional landscape biodiversity (Růžička et al. 2012).

The main component of traps used by López & Oromí (2010) for catching invertebrates in shallow subterranean habitats on the Canary Islands is a 75 cm long plastic pipe with an inner diameter of 11 cm. Many small holes (5-7 mm in diameter) are drilled along its surface, and a bottle containing preservation fluid (and bait) is lowered inside on a nylon cord. The pipes are installed vertically into holes in a suitable terrain. This kind of trap is a modification of a similar pipe used by Gers (1992). Barranco et al. (2013), Ortuño et al. (2013) and Jiménez-Valverde et al. (2015) used such traps to investigate invertebrates in stony slopes and river deposits in continental Spain; Nitzu et al. (2014) used a similar trap in Romania.

Schlick-Steiner & Steiner (2000) constructed a trap consisting of a perforated pipe and a set of removable plastic cups situated on a central-thread metal axis. Through this arrangement, the cups collect animals entering the tube through holes at particular depths. Using these complex pipe traps (with a length of 95 cm), Laška et al. (2011) studied the distribution of spiders in soil profiles and Rendoš et al. (2012) studied the distribution of invertebrates in limestone scree slopes. The design of perforation varies from a horizontal line of holes, to a network of holes up to horizontal cuttings accompanied by holes (Fig. 1a–c). The aim of this present study was to test the performance of pipe traps in soils and crevice systems.

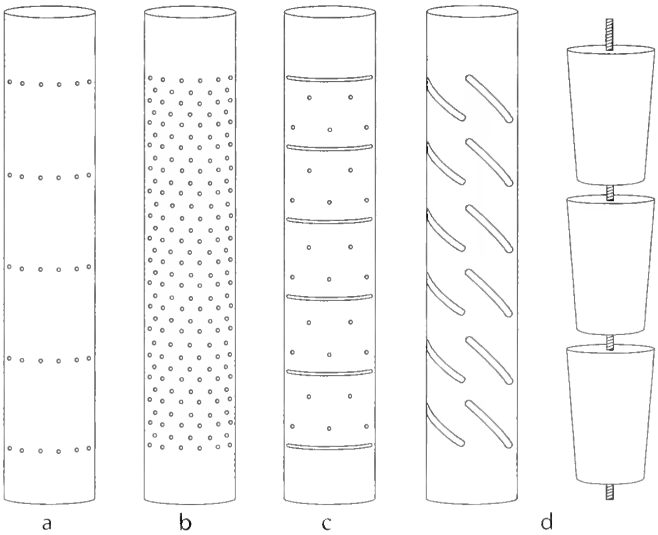

Fig. 1: Design of perforation; **a.** Schlick-Steiner & Steiner (2000); **b.** López & Oromí (2010); **c.** Laška et al. (2011); **d.** our design and a set of cups

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Material and methods

Sampling. Six pipe traps (one per site) were deployed from 2013 to 2015, and were emptied twice a year. The plastic pipes have an inner diameter of 7 cm, and are perforated with a system of oblique cuts 5 mm wide (Fig. 1d). This design has been registered at the Czech Industrial Property Office under No. 36420. Plastic cups were mounted onto a metal-thread rod at

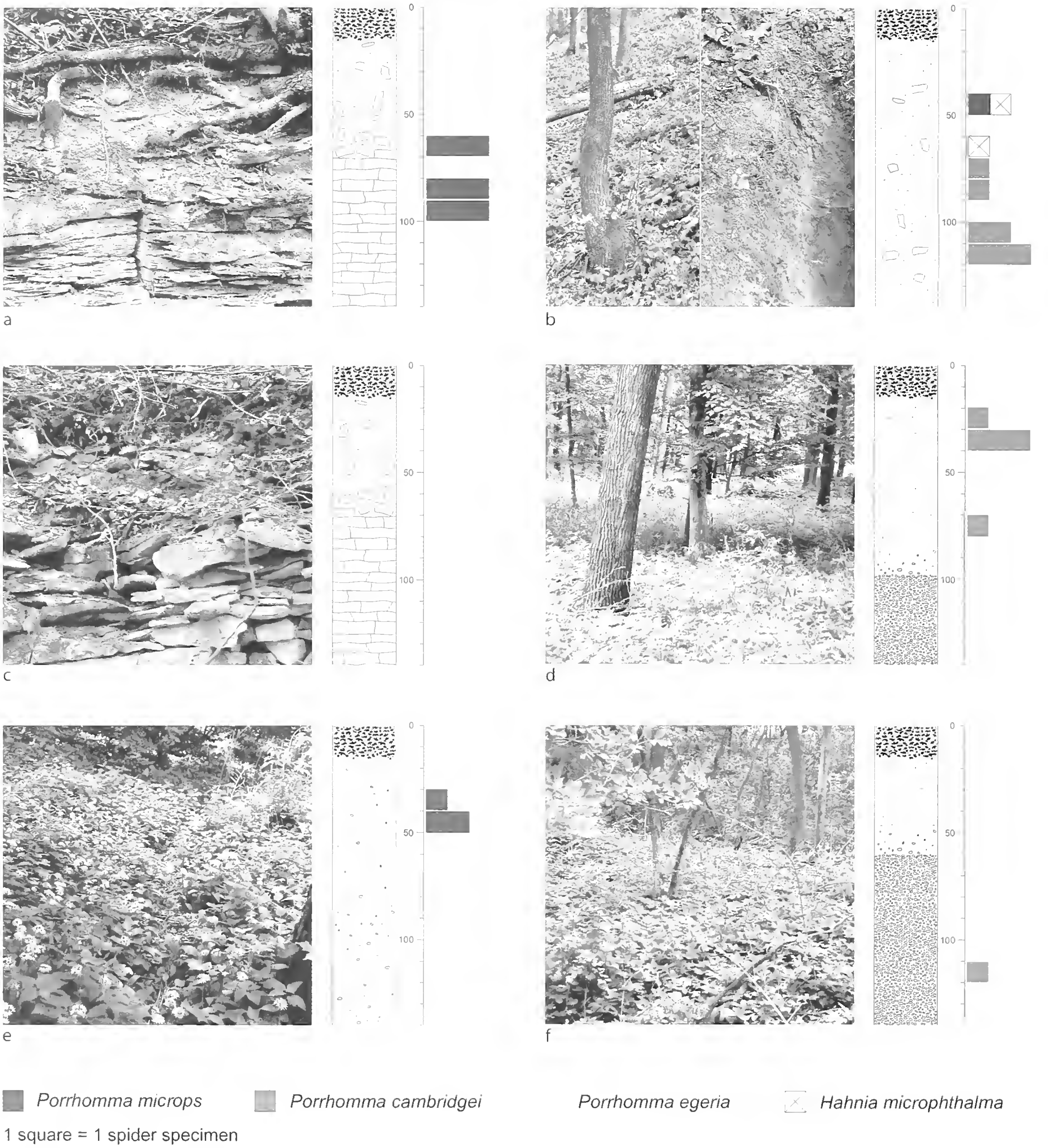

Fig. 2: Study sites with terrain profile and the depth-dependent occurrence of microphthalmic species; **a.** site SM-1, upper margin of a sandy marlite slope; **b.** site SM-2, lower margin of a sandy marlite slope; **c.** site SM-3, sandy marlite table hill; **d.** site AS-1, lowland forest; **e.** site AS-2, lowland forest; **f.** site AS-3, lowland forest

10 cm distances and contained a mixture of 7 % formalin and 5 % glycerol, plus a few drops of detergent (Růžička 1988b). In the final version, we used plastic or brass components to avoid damage to material caused by rust. We installed these traps in excavated trenches in sandy marlite terrains, or in boreholes (15 cm in diameter) in lowland forests, the deepest reaching 160 cm below the surface. The free space around the trap was filled by excavated material or – in the case of boreholes – by a mixture of excavated material and artificial rubble (Keramzit) or starch-based packing peanuts.

Study sites. Traps were installed in sandy (arenaceous) marlite (SM) terrains, and in alluvial soils in lowland forests (AS) (Figs 2a–f).

SM-1. Jenišovice-Mravín (49.9446°N, 16.0522°E, 335 m a.s.l.). On the upper margin of a sandy marlite slope at the border between a deciduous forest and a lucerne field: 0-60 cm stony soil, 60-100 cm fissured rock (Fig. 2a). The pipe with ten cups at a depth of 10-100 cm operated from 25 October 2013 to 29 September 2015. The spider assemblage of adjacent open habitats was studied by Dolanský (2002).

SM-2. The same locality as SM-1, 50 m apart (49.9445°N, 16.0516°E, 315 m a.s.l.), at the lower margin of a sandy marlite slope covered by deciduous forest (Fig. 2b). The whole profile studied consisted of a clay soil. The pipe with nine cups at a depth of 40-120 cm operated from 25 October 2013 to 29 September 2015.
SM-3. Kounov (50.2320°N, 13.6899°E, 515 m a.s.l.). Mixed forest on a sandy marlite table hill, 15 m from a quarry wall: 0-70 cm stony soil, 70-140 cm fissured rock (Fig. 2c). The pipe with 14 cups at a depth of 10-140 cm operated from 1 November 2013 to 25 September 2015.
AS-1. Lednice (48.7867°N, 16.8448°E, 170 m a.s.l.). Lowland forest with rich herb and shrub vegetation (Fig. 2d): 0-90 cm clay soil. Fluctuating water table. The pipe with nine cups at a depth of 10-90 cm operated from 29 June 2014 to 17 May 2015.
AS-2. Znojmo (48.8466°N, 16.1033°E, 220 m a.s.l.). Lowland forest with rich herb and shrub vegetation (Fig. 2e): 0-70 cm sandy soil. The pipe with seven cups at a depth of 10-70 cm operated from 20 August 2014 to 11 May 2015.
AS-3. Pardubice (50.0458°N, 15.7727°E, 220 m a.s.l.). Lowland forest with rich herb and shrub vegetation (Fig. 2f): 0-60 cm alluvial soil, 60-160 cm sand. The pipe with 16 cups at a depth of 10-160 cm operated from 15 May 2014 to 23 September 2015.

Results and discussion

Spiders

In total, we captured 335 spider specimens belonging to 32 species (Appendix): 155 spiders belonging to 20 species at site SM-1 (Tab. 1), 44 belonging to 10 species at site SM-2 (Tab. 2), 118 belonging to 12 species at site SM-3 (Tab. 3), 7 belonging to 3 species at site AS-1 (Tab. 4), 11 belonging to 3 species at site AS-2 (Tab. 5) and 7 belonging to 3 species at site AS-3 (Tab. 6). Spiders were recorded down to a depth of 120 cm. *Cicurina cicur* was the most abundant species. Species that were clearly tied to surface habitats (e.g., *Agroeca cuprea*) were usually recorded only a few tens of centimetres deep. Some individual records can be considered as accidental, e.g. the record of *Linyphia hortensis* at a depth of 110 cm, due to the fact that it is a typical shrub layer inhabitant (Buchar & Růžička 2002). *Cicurina cicur*, *Mioxena blanda*, *Palliduphantes pallidus*, *P. alutacius* and *Syedra myrmicarum* were depigmented with fully developed eyes. Four species were depigmented with reduced eyes and were clearly adapted to life in subterranean habitats. These species represent objects of our special interest.

Hahnia microphthalma

Material: Jenišovice-Mravín (SM-2), 25 October 2013-18 April 2014 1♀; 28 April-29 September 2015, 1♀. This species is reported for the first time from the CZECH REPUBLIC.

Posterior median eyes reduced (Fig. 3a). Szita et al. (1998) and Hänggi & Stäubli (2012) found various stages of eye reduction in their material, and also differences in the form of the translucent copulatory ducts. The picture of the copulatory ducts of the epigyne of our specimens is in agreement with that of the type specimen (Fig. 3b; cf. Snazell & Duffey 1980: Fig. 3).

Snazell & Duffey (1980) described the species according to two records from Great Britain. Hänggi & Stäubli (2012) summarized other records: three in Germany, one in Switzerland, and one in Hungary (Fig. 4). British specimens were collected in chalk grassland and in a field with a clay soil over-

Tab. 1: The species assemblage at SM-1. The number of males, females and juveniles (♂♂/♀♀/juv. [if determinable]) and the depth range (in cm) are shown. The species considered microphthalmic are shown in bold.

Species	♂♂/♀♀/juv.	Depth range
Lepthyphantes leprosus	0/1	10
Panamomops mengei	1/0	10
Tenuiphantes flavipes	6/1	10–20
Histopona torpida	0/4	10–40
Phrurolithus festivus	1/1	10–40
Amaurobius jugorum	1/2/3	10–70
Cicurina cicur	31/22/6	10–70
Harpactea rubicunda	12/27	10–80
Agroeca cuprea	1/0	20
Diplostyla concolor	4/4	20–30
Micrargus herbigradus	2/2	20–30
Coelotes terrestris	1/1	20–40
Liocranum rupicola	1/0	30
Ozyptila praticola	0/1	30
Harpactea lepida	1/0	40
Walckenaeria nudipalpis	0/1	40
Mioxena blanda	3/1	40–60
Syedra myrmicarum	0/2	50–80
Porrhomma microps	**5/4**	**70–100**
Mastigusa arietina	0/1	90

Tab. 2: The species assemblage at site SM-2

Species	♂♂/♀♀/juv.	Depth range
Clubiona terrestris	1/0	40
Coelotes terrestris	1/0	40
Histopona torpida	0/1	40
Micrargus herbigradus	6/3	40-70
Cicurina cicur	6/3/11	40-110
Porrhomma microps	**0/1**	**50**
Hahnia microphthalma	**0/2**	**50-70**
Amaurobius jugorum	0/1	80
Porrhomma cambridgei	**4/3**	**80-120**
Linyphia hortensis	0/1	110

Tab. 3: The species assemblage at site SM-3

Species	♂♂/♀♀/juv.	Depth range
Coelotes terrestris	1/0	10
Diplostyla concolor	1/5	10
Inermocoelotes inermis	1/0	10
Nusoncus nasutus	0/1	10
Harpactea lepida	1/2/3	10–40
Microneta viaria	0/2	10–50
Palliduphantes pallidus	3/3	10–100
Cicurina cicur	40/24/16	10–140
Harpactea hombergi	0/0/1	20
Centromerus sellarius	0/1	30
Porrhomma egeria	**1/8/3**	**70–140**

Tab. 4: The species assemblage at site AS-1

Species	♂♂/♀♀/juv.	Depth range
Robertus lividus	0/1	10
Palliduphantes alutacius	0/1	10
Porrhomma cambridgei	**3/1/1**	**30–80**

Tab. 5: The species assemblage at site AS-2

Species	♂♂/♀♀/juv.	Depth range
Cicurina cicur	4/1/1	10
Palliduphantes alutacius	0/2	20
Porrhomma microps	**1/1/1**	**40–50**

Tab. 6: The species assemblage at site AS-3

Species	♂♂/♀♀	Depth range
Palliduphantes alutacius	2/2	20
Syedra myrmicarum	1/1	20
Porrhomma cambridgei	**0/1**	**120**

lying chalk. Records in Germany were situated on sandstone and limestone bedrock (Sührig et al. 1998). The Hungarian locality was situated in an old field on loess (Szita et al. 1998).

All previous specimens were collected on the surface by pitfall traps, photoeclectors or by sweeping. Snazell & Duffey (1980) conclude that some of the characteristics of the spider suggest a subterranean habitat. We document for the first time that *H. microphthalma* inhabits the soil at a depth of about 50-70 cm.

Porrhomma cambridgei
Material: Jenišovice-Mravín (SM-2), 18 April-13 August 2014, 1♂ 1♀; 21 November 2014-28 April 2015, 2♂; 28 April-29 September 2015, 1♂ 2♀. Lednice (AS-1), 29 June-5 November 2014, 1♂ 1j.; 5 November 2014-17 May 2015, 2♂ 1♀. Pardubice (AS-3), 28 April-23 September 2015, 1♀.

Pickard-Cambridge (1871) noted that the species "*Linyphia*? *oblonga*" is characterized by "eyes very small". Based on the vulva structure, Millidge & Locket (1952) synonymized this microphthalmic form with *Porrhomma oblitum* (O. P.-Cambridge, 1871). Finally, Merrett (1994) removed it from synonymy with *P. oblitum* and revalidated it as a separate species *P. cambridgei* Merrett, 1994. It is clearly characterized by femora I and II without dorsal spines, a cephalothorax width < 0.58 mm, and reduced eyes. It has been recorded from Great Britain, Germany, Switzerland, northern Italy and the Czech Republic (Thaler et al. 2003).

We and Růžička et al. (2011, sub. *P.* aff. *myops*) captured this species in sandy marlite terrain and in alluvial soils at a depth of 35-120 cm. Thaler et al. (2003) collected this species on tree bark in the Bohemian Karst and we also obtained several specimens from conglomerate terrain and from karst caves.

Porrhomma egeria
Material: Kounov (SM-3), 5 April-14 July 2014, 1j.; 21 April-25 September 2015, 1♂ 8♀ 2j.

Porrhomma egeria inhabits caves and scree slopes, it also occurs in mountain spruce forests and subalpine zone (Buchar & Růžička 2002). It is fairly widespread in north-western, central and northern Europe (Nentwig et al. 2015). Its abundant occurrence in creviced rock is recorded for the first time.

Porrhomma microps
Material: Jenišovice-Mravín (SM-1), 21 November 2014-28 April 2015, 2♀; 28 April-29 September 2015, 5♂ 2♀. Jenišovice-Mravín (SM-2), 13 August-21 November 2014, 1♀. Znojmo (AS-2), 20 August 2014-11 May 2015, 1♂ 1♀ 1j.

Porrhomma microps is widespread in continental Europe (Nentwig et al. 2015). It inhabits leaf litter in floodplain forests and was also recorded in caves, not deeper than 10 m. It was also recorded in the soil on a sandy marlite at a depth of 55-135 cm by Laška et al. (2011), and in lowland forest at a depth of 5-45 cm by Růžička et al. (2011). The specimen reported by Růžička et al. (2013, Fig. 6) from a depth of 80 m was misidentified and is actually *P. profundum* M. Dahl, 1939.

Habitats

Sandy marlite. In a clay soil at site SM-2, we captured three microphthalmic species together: *Porrhomma microps*, *Hahnia microphthalma* and *P. cambridgei* (Tab. 2). We captured *P. egeria* in a layer of fissured rock at site SM-3 (Tab. 3).

Porrhomma microcavense Wunderlich, 1990 was reported from a sandstone landscape for the first time in the Czech Republic (Buchar & Růžička 2002). However, in detail, it was recorded above a sandy marlite layer. Furthermore slightly microphthalmic specimens of *Oreonetides quadridentatus* (Wunderlich, 1972) were captured by Laška et al. (2011; sub *Maro* sp.) at a depth of 45 and 65 cm in clay soil on sandy marlite bedrock, together with *Porrhomma microps*.

Alluvial soils. We collected *P. cambridgei* and *P. microps* in alluvial soil/sand in three different localities in lowland forests near a river. In the same habitat, Růžička et al. (2011) collected these two species together. Together with *H. microphthalma*, these two species can be considered soil spiders.

Concluding remarks

The importance of shallow subterranean habitats for the evolution of subterranean life is well known (Růžička 1999, Giachino & Vailati 2010, Růžička et al. 2013, Culver & Pipan

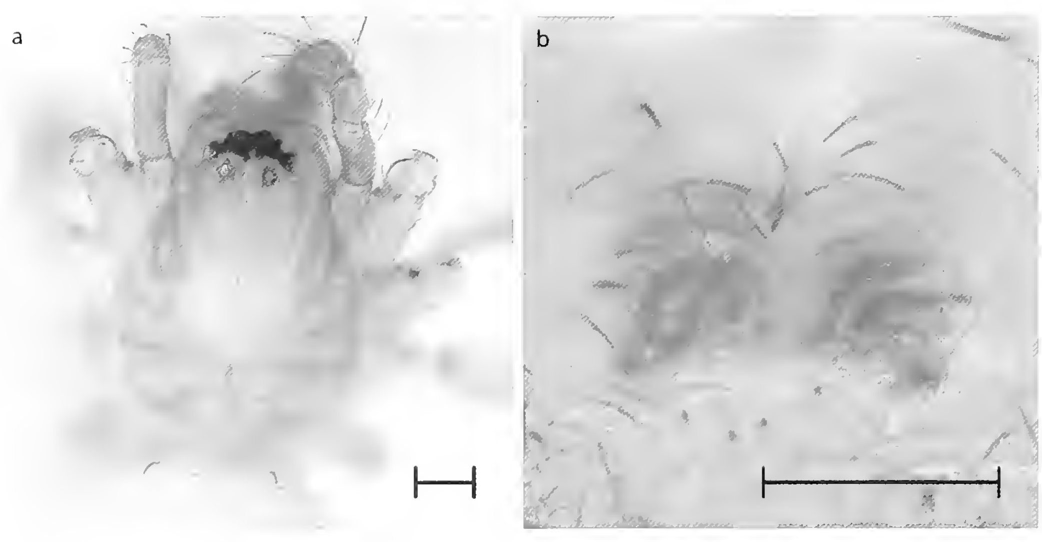

Fig. 3: *Hahnia microphthalma*; **a.** eye arrangement; **b.** epigyne. Scale line 0.1 mm

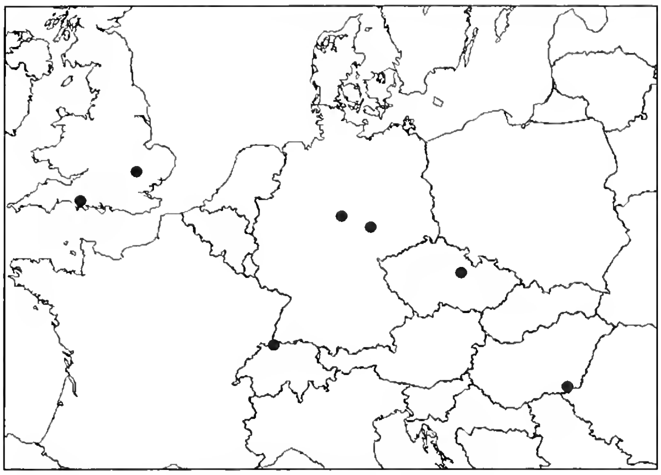

Fig. 4: *Hahnia microphthalma*: map of the known records

2014) and has been repeatedly documented in recent years. Using pipe traps, Deltshev et al. (2011) collected spiders in soils down to the depth of 80 cm in the Bulgarian mountains. *Zangherella relicta* (Kratochvíl, 1935), described from a cave in Montenegro, was recorded, which represents the first record of the family Anapidae in Bulgaria. Gilgado et al. (2015) collected the troglomorphic millipede *Typhlopsychrosoma baeticaense* (Mauriés, 2013), known from caves, in mountain screes and concluded that some subterranean species might have surprisingly wide distribution areas, and that study of shallow subterranean habitats will surely improve our poor knowledge on subterranean biodiversity.

There is a wide spectrum of sedimentary rocks containing variable amounts of clay and silt designated as marl or marlite. Their properties depend on mineralogical composition and diagenesis. In the Alicante region (Spain), the marl offers no suitable insterstices for a subterranean fauna, and marl layers constitute physical barriers to the movement of subterranean animals (Ortuño et al. 2013, Gilgado et al. 2015). On the other hand, in the Czech Republic, the indurated sandy marlite forms a fissure network. This fissure network, together with soils originating from this bedrock, constitutes a subterranean habitat that seems to be very suitable for the subterranean fauna, according to our findings.

In subterranean biology, there is a common idea that alluvial plains are barriers to subterranean faunas, and that they do not have suitable spaces (Uéno 1987). However, this depends on the size of the sand and gravel grains. Christian (1998) recorded a subterranean palpigrade *Eukoenenia austriaca* (Hansen, 1926) (usually found in caves) in the bottom substrate of the tombs of St. Stephen's Cathedral in Vienna. These catacombs were dug down to the Pleistocene gravel of the Danube river. Gilgado & Ortuño (2015) recorded a subterranean zygentomid *Coletinia maggii* (Grassi, 1887) (usually found in surface habitats, ant nests and caves) in a subsoil gravel layer in an alluvial plain in northern Spain. We collected subterranean spiders in three different alluvial plains. These findings suggest the possibility that alluvial deposits might represent 'connectors' between other subterranean habitats, at least for some subterranean animals. Moreover, in the locality AS-1, we collected not only the subterranean spider *Porrhomma cambridgei* at a depth of 30–80 cm, but also a pale subterranean *Niphargus* sp. at a depth of 0–90 cm. Crustaceans thus migrated into soil horizons from shallow aquatic interstitial habitats at the time of flooding.

The modified space around the pipe can represent an artificial corridor through which invertebrates can migrate in a vertical direction. Nevertheless, the vertical distributions of spiders are clearly species-specific as also documented by Laška et al. (2011). In both cases of the common occurrence of *P. microps* and *P. cambridgei* (our site SM-2 and Růžička et al. 2011), the smaller species *P. cambridgei* occupies deeper soil horizons.

On the other hand, the soil structure is destroyed during installation of the traps, and fine crevices are closed. The reconstruction of the network of voids can take several years, as we infer by the catching of the first adults of *P. egeria* after two years of investigation.

Finally, we would like to recommend the use of complex pipe traps, which enables precise documentation of the depth distribution of species. We would like to emphasize that to document the occurrence of troglomorphic invertebrates, data on the subterranean habitat (not only data on surface habitat, e.g. plant associations) are important.

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Appendix

Taxonomic survey of species collected. **Dysderidae**: *Harpactea hombergi* (Scopoli, 1763), *Harpactea lepida* (C. L. Koch, 1838), *Harpactea rubicunda* (C. L. Koch, 1838); **Theridiidae**: *Robertus lividus* (Blackwall, 1836); **Linyphiidae**: *Centromerus sellarius* (Simon, 1884), *Diplostyla concolor* (Wider, 1834), *Lepthyphantes leprosus* (Ohlert, 1865), *Linyphia hortensis* Sundevall, 1830, *Micrargus herbigradus* (Blackwall, 1854), *Microneta viaria* (Blackwall, 1841), *Mioxena blanda* (Simon, 1884), *Nusoncus nasutus* (Schenkel, 1925), *Palliduphantes alutacius* (Simon, 1884), *Palliduphantes pallidus* (O. P.-Cambridge, 1871), *Panamomops mengei* Simon, 1926, *Porrhomma cambridgei* Merrett, 1994, *Porrhomma egeria* Simon, 1884, *Porrhomma microps* (Roewer, 1931), *Syedra myrmicarum* (Kulczyński, 1882), *Tenuiphantes flavipes* (Blackwall, 1854); *Walckenaeria nudipalpis* (Westring, 1851); **Agelenidae**: *Coelotes terrestris* (Wider, 1834), *Histopona torpida* (C. L. Koch, 1834), *Inermocoelotes inermis* (L. Koch, 1855); **Hahniidae**: *Hahnia microphthalma* Snazell & Duffey, 1980; **Dictynidae**: *Cicurina cicur* (Fabricius, 1793); *Mastigusa arietina* (Thorell, 1871); **Amaurobiidae**: *Amaurobius jugorum* L. Koch, 1868; **Liocranidae**: *Agroeca cuprea* Menge, 1873, *Liocranum rupicola* (Walckenaer, 1830); **Phrurolithidae**: *Phrurolithus festivus* (C. L. Koch, 1835); **Thomisidae**: *Ozyptila praticola* (C. L. Koch, 1837).

Further notes on spiders from the Special Nature Reserve Zasavica (Serbia)

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Abstract. Zasavica is a wetland in western central Serbia with very little information on its spider fauna. During 2011 faunistic research was carried out; the material collected mostly using pitfall traps, but also sweep netting, beating and hand-collecting. A total of 3053 individuals were caught, and 107 species from 21 families were identified. Among these species, seven are first records for the Serbian fauna: *Holocnemus pluchei* (Scopoli, 1763), *Dactylopisthes digiticeps* (Simon, 1881), *Walckenaeria alticeps* (Denis, 1952), *Pachygnatha listeri* Sundevall 1830, *Liocranoeca striata* (Kulczyński, 1882), *Phrurolithus minimus* C. L. Koch, 1839 and *Tibellus maritimus* (Menge, 1875). Additionally, 59 species are new for the reserve. Beside a new species list for the reserve, some notes on these national records were made.

Keywords: deciduous forest, devastation, inundation forest, new records, Serbian fauna

Zusammenfassung. Ergänzungen zur Spinnenfauna des Zasavica-Naturschutzgebietes (Serbien). Zasavica ist ein Feuchtgebietskomplex im westlichen Mittelserbien, zum dem bisher nur wenige arachnologische Daten vorliegen. Im Jahr 2011 wurde eine faunistische Erhebung durchgeführt, wobei die Erfassung der Spinnen mittels Barberfallen, Keschern, Klopfen und Handaufsammlungen erfolgte. Insgesamt wurden 3053 Individuen, die sich auf 107 Arten aus 21 Familien verteilten, gesammelt. Sieben Arten wurden hierbei erstmals für Serbien nachgewiesen: *Holocnemus pluchei* (Scopoli, 1763), *Dactylopisthes digiticeps* (Simon, 1881), *Walckenaeria alticeps* (Denis, 1952), *Pachygnatha listeri* Sundevall 1830, *Liocranoeca striata* (Kulczyński, 1882), *Phrurolithus minimus* C. L. Koch, 1839 und *Tibellus maritimus* (Menge, 1875). 59 Arten sind Neufunde für Zasavica. Neben einer aktualisierten Artenliste wird die Ökologie und Verbreitung der Neufunde für Serbien näher beschrieben.

Research on spiders in Serbia has been neglected for years. From the first published data (Spasojević 1891) to the latest (Grbić et al. 2015), only 696 species were reported. As Serbia is a part of the Balkans, it could be marked as one of the most significant biodiversity regions in Europe (Savić 2008). The great number (379) of Balkans endemic spider species (Deltshev 2004), and Serbian endemic spiders (21) (Deltshev et al. 2003) support this hypothesis, but an understanding of its importance in support of more faunistic research is lacking. A rare positive example is the management of the Special Nature Reserve (SNR) Zasavica.

SNR Zasavica is a wetland in the western central Serbian region of Mačva. The majority of the protected zone includes the water surface of the Zasavica river and the Jovača, Prekopac and Batar canals. The second largest protected area is the Valjevac pasture with its mixture of semi-aquatic and hydrophilic vegetation and a dry pasture. Also under legal protection is the forest vegetation of the Reserve that contains various hydrophilic forests of European ash, poplar, willow and black alder (Obratov-Petković et al. 2007).

The first historical data reveal that only five spider species were recorded at the locality of Crna bara by Stoićević (1929): *Araneus diadematus* Clerck, 1757, *Araniella cucurbitina* (Clerck, 1757), *Dipoena braccata* (C. L. Koch, 1841), *Heliophanus cupreus* (Walckenaer, 1802) and *Xysticus lanio* C. L. Koch, 1835. Several years later, Drensky (1936) added *Argyroneta aquatica* (Clerck, 1757) to the list, found at the same locality (in Deltshev et al. 2003: 173), but after that no effort was invested in any kind of spider research in this area. Finally Grbić et al. (2011) created the first significant list of 104 spider species based on material collected during student scientific research camps that were organized only in August 2008, 2009 and 2010. In this study, five species were recorded for the first time in Serbia and, except for *D. braccata* and *X. lanio*, the historical records could be confirmed. This preliminary list of species formed a basis for future faunistic and ecological studies.

In 2011, further collection was performed at the localities of Valjevac and Turske livade, with an emphasis on the faunistic data and species composition in flooded and non-flooded forest areas. The project was a part of the Master's thesis of the first author. The results presented here are envisaged as additions to the faunal list and a short presentation of spider species new to Serbia. The second purpose of the manuscript is to draw attention to ongoing habitat devastation of the area that is out of control, and which could affect survival of the species.

Material and methods

The Turske livade locality (44° 57' 32", 19° 31' 37") is situated on the left side of the Zasavica river, at an altitude of 78–80 m. It consists of small forest fragments and arable land (Obratov-Petković et al. 2007). About 80% of these forests are private property (Stanković pers. comm.). Wood harvesting happens often, with no supervision, so human influence is very intensive on these forest habitats. For the purpose of this research, two non-flooded forests (coded as non-flooded forests 1 and 2) and one flooded forest were chosen. Non-flooded forests 1 and 2 are deciduous forest fragments with dry vegetation, a thick duff layer and many bushes. The flooded forest has dense vegetation with lots of shade, and becomes flooded during spring. More details on the vegetation of the habitats are given in Tab. 1.

The Valjevac locality (44° 56' 10", 19° 31' 11") is also situated on the left side of the river and at the same altitude as the previous locality, and it consists of a large pasture, forest fragments and arable land. The pasture is property of the Reserve, while 80% of the woods and all arable land are private property (Stanković pers. comm.). On this locality, one non-flooded forest, one flooded forest, the riverside near the Visitors' Centre and a pasture site were chosen for fieldwork. The non-flooded forest has a dense canopy, which provides lots of

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Tab. 2: ff.

General information	Valjevac				Turske livade			Number
Habitat	**Flood forest**	**Non-flood forest**	**Visitor's center riverside**	**pasture**	**Flood forest**	**Non-flood forest 1**	**Non-flood forest 2**	**of individuals**
Diplostyla concolor (Wider, 1834) ˋ	196/194	.	15/6	.	112/36	0/1	2/0	562
Erigone dentipalpis (Wider, 1834)	9/0	0/1	68/0	.	43/0	.	1/0	122
Linyphia triangularis (Clerck, 1757)	1/0	.	1/0	.	2/0	2/0	0/2	8
Microlinyphia pusilla (Sundevall, 1830)	.	.	.	1/0	.	.	.	1
Neriene clathrata (Sundevall, 1830)	0/9	.	.	.	.	.	.	9
Oedothorax apicatus (Blackwall, 1850) ˋ	.	.	50/68	.	.	.	9/19	146
Pelecopsis radicicola (L. Koch, 1872) ˋ	.	.	.	.	3/2	.	.	5
Prinerigone vagans (Audouin, 1826)	.	.	2/0	.	.	.	.	2
Walckenaeria alticeps (Denis, 1952) * ˋ	.	.	.	.	1/0	.	.	1
Walckenaeria furcillata (Menge, 1869) ˋ	.	.	.	.	2/0	11/6	8/11	38
Walckenaeria mitrata (Menge, 1868) ˋ	.	1/0	.	.	.	.	.	1
Tetragnathidae								
Pachygnatha clercki Sundevall, 1823 ˋ	1/0	.	5/0	.	2/0	.	1/0	9
Pachygnatha degeeri Sundevall, 1830	5/3	.	4/4	.	9/3	.	1/0	29
Pachygnatha listeri Sundevall, 1830 * ˋ	1/0	.	0/4	.	1/2	.	.	8
Tetragnatha extensa (Linnaeus, 1758)	.	.	3/1	.	.	.	.	4
Tetragnatha montana Simon, 1874	.	1/0	.	.	2/0	.	.	3
Tetragnatha nigrita Lendl, 1886 ˋ	.	.	.	1/0	.	.	.	1
Tetragnatha pinicola L. Koch, 1870 ˋ	.	.	.	0/1	.	.	.	1
Araneidae								
Araneus diadematus Clerck, 1757	.	.	.	.	.	0/1	.	1
Araneus quadratus Clerck, 1757	.	.	.	1/0	.	.	.	1
Hypsosinga pygmaea (Sundevall, 1831)	.	.	.	0/2	.	.	.	2
Larinioides patagiatus (Clerck, 1757)	.	.	.	3/3	.	.	.	6
Mangora acalypha (Walckenaer, 1802)	.	.	.	0/1	.	.	.	1
Singa hamata (Clerck, 1757) ˋ	.	.	.	0/1	.	.	.	1
Lycosidae								
Alopecosa cf. *pinetorum* (Thorell, 1856) ˋ	.	.	1/0	.	.	.	.	1
Arctosa leopardus (Sundevall, 1833)	0/1	.	147/44	1/0	4/3	.	2/3	205
Pardosa agrestis (Westring, 1861)	3/6	.	7/0	.	0/1	.	.	17
Pardosa alacris (C.L. Koch, 1833) ˋ	.	0/1	.	.	7/4	0/2	9/62	85
Pardosa amentata (Clerck, 1757)	0/12	.	8/13	0/1	3/6	0/2	1/1	47
Pardosa hortensis (Thorell, 1872)	0/2	.	3/5	.	.	0/1	0/2	13
Pardosa lugubris (s.lat.) (Walckenaer, 1802)	0/1	.	.	.	0/7	0/5	0/9	22
Pardosa cf. *mixta* (Kulczyński, 1887) ˋ	0/2	.	.	.	.	.	.	2
Pardosa monticola (Clerck, 1757)	1/6	.	0/2	.	0/1	.	.	10
Pardosa prativaga L. Koch, 1870	0/2	.	8/1	.	6/1	.	.	18
Pardosa proxima (C.L. Koch, 1847)	1/7	.	28/10	0/4	.	.	2/0	52
Pardosa vittata (Keyserling, 1863) ˋ	0/2	.	.	.	.	.	.	2
Pirata piraticus (Clerck, 1757)	1/1	.	4/9	.	1/0	.	.	16
Pirata cf. *tenuitarsis* Simon, 1876 ˋ	.	.	13/0	.	.	.	.	13
Piratula hygrophila (Thorell, 1872)	5/20	1/12	5/2	.	11/4	.	1/0	61
Piratula latitans (Blackwall, 1841)	0/8	.	128/27	.	36/8	.	0/1	208
Trochosa hispanica Simon, 1870 ˋ	2/0	1/2	.	.	8/3	.	.	16
Trochosa ruricola (De Geer, 1778) ˋ	.	.	1/0	.	.	.	.	1
Xerolycosa miniata (C.L. Koch, 1834) ˋ	0/1	.	.	.	.	.	.	1
Pisauridae								
Dolomedes fimbriatus (Clerck, 1757)	1/0	.	.	.	.	.	.	1
Dolomedes plantarius (Clerck, 1757)	.	.	0/1	.	.	.	.	1
Pisaura mirabilis (Clerck, 1757)	0/1	.	.	.	1/2	.	1/1	6
Miturgidae								
Zora spinimana (Sundevall, 1833) ˋ	.	1/3	.	.	.	.	.	4
Agelenidae								
Agelena labyrinthica (Clerck, 1757)	.	.	.	.	4/0	.	.	4
Histopona torpida (C.L. Koch, 1837)	.	6/1	.	.	7/0	109/20	96/28	267

Tab. 2. ff.

General information	Valjevac				Turske livade			Number of individuals
Habitat	**Flood forest**	**Non-flood forest**	**Visitor's center riverside**	**pasture**	**Flood forest**	**Non-flood forest 1**	**Non-flood forest 2**	
Tegenaria campestris (C.L. Koch, 1834) ˋ	.	2/0	.	.	.	.	.	2
Tegenaria silvestris (L. Koch, 1872) ˋ	.	.	.	.	.	0/1	.	1
Urocoras longispinus (Kulczyński, 1897) ˋ	.	70/11	.	.	67/11	129/8	4/0	300
Dictynidae								
Dictyna uncinata Thorell, 1856	.	.	.	.	1/0	.	.	1
Liocranidae								
Agroeca cuprea Menge, 1873 ˋ	0/1	.	.	.	.	4/0	0/4	9
Liocranoeca striata (Kulczyński, 1882) * ˋ	0/7	0/6	.	.	1/0	2/0	.	16
Clubionidae								
Clubiona brevipes Blackwall, 1841 ˋ	.	.	.	0/1	.	.	.	1
Clubiona comta C.L. Koch, 1839 ˋ	.	.	.	.	.	.	1/0	1
Clubiona lutescens Westring, 1851	1/4	.	.	.	2/2	.	.	9
Clubiona pallidula (Clerck, 1757)	.	.	.	.	1/0	.	1/3	5
Clubiona phragmitis C.L. Koch, 1843 ˋ	.	.	1/0	.	.	.	.	1
Clubiona terrestris Westring, 1851	.	0/1	.	.	.	2/2	.	5
Corinnidae								
Cetonana laticeps (Canestrini, 1868) ˋ	.	.	.	.	.	2/0	.	2
Phrurolithidae								
Phrurolithus festivus (C.L. Koch, 1835) ˋ	17/33	.	6/1	.	91/10	.	.	158
Phrurolithus minimus C.L. Koch, 1839 * ˋ	5/0	.	.	.	.	.	.	5
Gnaphosidae								
Drassyllus lutetianus (L. Koch, 1866) ˋ	1/0	.	2/0	.	0/1	.	.	4
Drassyllus pusillus (C.L. Koch, 1833) ˋ	0/1	.	.	.	.	.	.	1
Drassyllus villicus (Thorell, 1875) ˋ	0/3	.	.	.	4/0	.	13/7	27
Haplodrassus silvestris (Blackwall, 1833) ˋ	.	.	.	.	.	.	5/0	5
Micaria pulicaria (Sundevall, 1831) ˋ	.	.	.	.	1/0	.	.	1
Trachyzelotes pedestris (C.L. Koch, 1837) ˋ	1/6	.	.	.	5/1	.	3/2	18
Zelotes apricorum (L. Koch, 1876) ˋ	1/0	.	.	.	2/5	.	1/1	10
Zelotes latreillei (Simon, 1878) ˋ	2/0	.	0/1	.	2/1	.	.	6
Philodromidae								
Tibellus maritimus (Menge, 1875) * ˋ	.	.	0/1	.	.	.	.	1
Thomisidae								
Cozyptila blackwalli (Simon, 1875) ˋ	.	.	.	.	.	.	1/0	1
Ebrechtella tricuspidata (Fabricius, 1775)	.	.	.	5/0	.	.	.	5
Misumena vatia (Clerck, 1757)	.	.	.	7/0	.	.	.	7
Ozyptila praticola (C.L. Koch, 1837)	42/12	0/4	.	.	21/2	74/0	50/0	205
Ozyptila simplex (O. P.-Cambridge, 1862) ˋ	0/2	.	.	.	.	.	.	2
Synema globosum (Fabricius, 1775)	.	.	.	1/0	.	.	.	1
Tmarus piger (Walckenaer, 1802)	.	1/0	.	.	0/1	.	.	2
Xysticus kochi Thorell, 1872	2/0	.	0/1	.	.	.	.	3
Xysticus luctator (L. Koch, 1870)	.	.	.	.	22/0	9/0	5/0	36
Salticidae								
Ballus chalybeius (Walckenaer, 1802) ˋ	.	.	.	.	.	9/2	1/0	3
Evarcha falcata (Clerck, 1757)	.	.	.	.	.	.	1/0	1
Evarcha laetabunda (C.L. Koch, 1846) ˋ	.	.	.	1/0	.	.	.	1
Heliophanus flavipes (Hahn, 1832)	1/0	.	.	.	.	.	.	1
Marpissa muscosa (Clerck, 1757)	0/1	1/0	.	.	.	.	.	2
Marpissa radiata (Grube, 1859) ˋ	.	1/0	.	.	.	.	.	1
Mendoza canestrinii (Ninni, 1868)	.	.	0/1	.	.	.	.	1
Myrmarachne formicaria (De Geer, 1778) ˋ	.	0/1	.	.	.	.	.	1
Neon reticulatus (Blackwall, 1853) ˋ	0/1	.	.	.	.	0/1	.	2
Pseudeuophrys obsoleta (Simon, 1868) ˋ	.	.	2/0	.	.	.	.	2
Pseudicius encarpatus (Walckenaer, 1802)	.	.	1/0	.	.	.	.	1
Salticus zebraneus (C.L. Koch, 1837) ˋ	.	.	0/1	.	.	.	.	1
Sitticus floricola (C.L. Koch, 1837) ˋ	.	.	1/0	0/1	.	.	.	2

Analysing the result presented in Tab. 2, some clear differences between the habitats are obvious but will not be discussed in detail. In the forest habitats, the highest number of species was found in the flooded forest at the Valjevac locality, where 46 spider species were recorded, while the smallest number of species was in the non-flooded forest at the same locality (19 species) (Tab. 2). At the second research locality of Turske livade, even lower numbers of species were recorded in all habitats compared to the Valjevac flooded forest. No species were common for all the habitats (Tab.2).

Discussion

First records for the Serbian spider fauna

Holocnemus pluchei

Records. 1♀, 16.09.2011; Valjevac – flooded forest

Note. The original distribution for this species is Africa, the Mediterranean region and the Middle East (Huber 2011), but today this species is spread over Western, Central and Eastern Europe (World Spider Catalog 2014). According to Nentwig et al. (2014), it was previously recorded in the countries surrounding Serbia, so this species was expected to be found here as well. The related species, *H. caudatus* (Dufour, 1820) and *H. hispanicus* Wiehle, 1933, have a very low probability of appearance in our region, since they are common in Spain, Portugal and Sicily (World Spider Catalog 2014).

Dactylopisthes digiticeps

Records. 12♂♂ 10.06.2011; 32♂♂ 30.06.2011; 4♂♂ 03.08.2011. Valjevac – a riverside Visitors' Centre; 2♂♂ 30.06.2011. Turske livade - Non-flood forest 2

Note. This species was first described by Simon (1881) from a male specimen, while the female was described 115 years later (Weiss & Schneider 1996). As a typical habitat of this spider, Weiss & Schneider (1996) suggested wetlands and vegetation near water. In their research it was found at some localities near the Danube River together with other wetland species. According to the World Spider Catalog (2014), the global distribution of this species covers an area from Europe to Israel, Iran and Afghanistan, but in Europe this species was recorded only in some countries (Nentwig et al. 2014): France, Austria, Romania, Ukraine, Greece. Because of its scattered distribution, this record represents an important element of the Serbian fauna and we feel obliged to make a note about how its future could be affected here. The Visitor's centre at the riverside where this species if found is under a great pressure from tourism (both legal and illegal) and uncontrolled seasonal cane harvesting. According to what we know from the field, we think that there is a high possibility of habitat loss in the near future so these new records would be lost and the species could become lost in Serbia too. For prevention we suggest that this species should be included in the list of protected species in Serbia. Only if SNR Zasavica has a legal obligation to pay more attention to this species and its habitat will everything be maintained.

Walckenaeria alticeps

Records. 1♂ 12.10.2011; Turske livade – flood forest

Note. Closely related and often confused with *W. antica*. Males of these species are morphologically very similar (Kronestedt 1980, Palmgren 1982), both in the cephalic part and in the configuration of the palps. Females are less problematic (Kronestedt 1980), but we didn't have any among our material. The sibling species *W. antica* was recorded in Serbia (in Deltshev et al. 2003:132) in 1929 and 1936 before *W. alticeps* (Denis, 1952) was even described and since the old material is not available, it remains uncertain what we had in Serbia so far. If we accept that we already had *W. antica*, looking at the global distribution area of the *W. alticeps*, which is from Europe to Central Asia (World Spider Catalog 2014), this record in Serbia is not surprising (Nentwig et al. 2014).

Pachygnatha listeri

Records. 1♂/1♀ 10.06.2011. Turske livade – flood forest; 3♀♀ 30.06.2011. Valjevac – a riverside Visitors' center; 1♂ 3.08.2011 Valjevac – flood forest; 1♀ 3.08.2011 Valjevac – a riverside Visitors' center; 1♀ 15.09.2011.Turske livade – flood forest

Note. In general appearance similar to the *P. clercki* and *P. terilis* but close study of genital details allows it to be distinguished very well (Nentwig et al. 2014). It has a Palaearctic distribution (World Spider Catalog 2014) and it is widely distributed in Europe. The species was not found in most countries of the Balkan Peninsula, except Bulgaria and Romania (Nentwig et al. 2014). Based on such a wide distribution, this species was expected to be found in our country as well. Our discovery of this species in the flooded forests of both localities also corresponds to literature data (Roberts 1995, Krumpálová 1997, Hänggi et al.1995).

Liocranoeca striata

Records. 1♂ 10.06.2011. Turske livade – flood-forest; 2♂♂ 30.06.2011. Turske livade – non-flood foorest 1; 5♀♀ 03.08.2011. Valjevac – flood forest; 5♀♀ 03.08.2011. Valjevac – non-flood forest; 2♀♀ 16.09.2011. Valjevac – flood forest; 1♀ 16.09.2011. Valjevac – non-flood forest

Note. Not so hard to determine although several synonyms make a literature search more difficult. According to the World Spider Catalog (2014), this species is distributed across Europe and Russia. Widespread but rare in northern Europe (Roberts 1995), it was already recorded in some surrounding countries (Hungary, Macedonia, Bulgaria, Romania) (Nentwig et al. 2014), so it could be expected in Serbia too. This species prefers wet habitats, especially deciduous forests on wetlands and alluvial plains (Roberts 1995, Buchholz 2009, Nentwig et al. 2014). According Hänggi et al. (1995) it is associated exclusively with the "layer 1" which means that it prefers soil and litter.

Phrurolithus minimus

Records. 5♂♂ 03.08.2011; Valjevac – flood forest

Note. The global distribution of this species is Palearctic (World Spider Catalog 2014), and it is present all over Europe, but not in most parts of the Balkan Peninsula (Nentwig et al. 2014). Since it was recorded in Hungary and Romania (Nentwig et al. 2014), it was expected to be found in Serbia too. According to Nentwig et al. (2014) and Hänggi et al. (1995), this species prefers dry meadows, steppes, rocky slopes and open forests, but could also be found on peat area (Rėlys & Dapkus 2002) or at the edges of forests and on oligotrophic grasslands (Hänggi et al. 1995). It is connected to the litter (Hänggi et al. 1995) where we also found it in flooded wood of willow, ash and European alder.

Tibellus maritimus
Records. 1♂ 10.06.2011; Valjevac – a riverside Visitors' center
Note. Among the European philodromid species *Tibellus* sp. can easily be distinguished by the slender body and legs. Differences between the species in the genera are more or less solid, so determination is not so complicated (Efimik 1999). This species has a Holarctic distribution (World Spider Catalog 2014), and with records from almost all European countries (Nentwig et al. 2014) it was also expected in Serbia. Usually *T. maritimus* can be found both on humid and dry but also sunny places (Nentwig et al. 2014, Cera et al. 2010), and the riverside Visitor's centre in our study is just like that. But like in the case of *Dactylopisthes digiticeps* described earlier, the future of the species is uncertain since the riverside is under constant threat. If we add the fact that this species completely disappeared from Poland after the drying up of flooded areas (Kajak 1993), we have to suggest that this species should also be included in the list of protected species in Serbia to prevent the possibility of a loss scenario.

Species of special interest

Tetragnatha pinicola
Records. 1♀ 19.05.2011.Valjevac - pasture
Note. Very similar to *T. extensa* (see Russell-Smith 2011). Although they normally differ markedly in size, occasionally *T. pinicola* may superficially resemble young *T. extensa* and stayed unnoticed. This specimen was found by chance and caught by sweep netting. Apparently it has a Palaearctic distribution (World Spider Catalog 2014), but it is also considered very rare in Northern Europe (Roberts 1995). In Serbia this species was last recorded in 1985 at the Sokolica locality on the Veliki Jastrebac Mountain (Deltshev et al. 2003). Since then no recent records were made and its current status in the country cannot be determined, therefore its rediscovery in the protected area of the SNR Zasavica could be highly relevant for the species and for the future habitat protection plans of the Reserve.

Trochosa hispanica
Records. 3♂♂/2♀♀ 03.08.2011.Valjevac – non-flood forest; 2♂♂ 03.08.2011.Valjevac – flood forest; 8♂♂/3♀♀ 12.10.2011. Turske livade – flood-forest
Note. According to literature data *T. hispanica* was very recently found in Serbia by Ćurčić et al. (2007) in Čačak. But as Hepner & Milasowszky (2006) noted, many misidentifications of *Trochosa* females occur in museum and private collections. Considering also that no specimens from Serbia have been included in their revision or rechecked yet, there is a possibility that *T. hispanica* could be more widely present in Serbia, not only at the two recently discovered localities. Unfortunately, most of the old collection records are lost or could not be re-checked, so the current status and distribution of the *T. hispanica* as a Mediterranean species (Nentwig et al. 2014) in Serbia still needs to be confirmed.

Conclusions

Based on our first impressions, the number of new records in Serbia appears to be high for the small sampled area, but most of the species were already known in the surrounding countries (Nentwig et al. 2014), thus their presence at Zasavica was not unexpected. This research increased the total number of species in Serbia to 703, although this is only a fraction of what would be expected for this region. More important is that this is a one more step towards a future comprehensive species list. Spider research in the Special Nature Reserve Zasavica is also far from complete. Together with the current results, a total number rose to 163 species, but we could roughly estimate that at least the same number still awaits detection. In future studies, it should be investigated if there is any connection between species compositions and human devastation in the area, since unsupervised harvesting is still taking place.

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Sažetak

Zasavica predstavlja jedno od vlažnih staništa centralne Srbije sa veoma malo podataka o fauni paukova. Zbog toga je 2011 godine sprovedeno faunističko istraživanje tokom kojeg je material najvećim delom sakupljan klopkama, ali i ručno, zatim košenjem i trešenjem. Ukupno je sakupljeno 3053 jedinki i utvrdjeno je 107 vrsta iz 21 familije. Medju svim tim vrstama, sedam predstavlja prve nalaze za faunu Srbije: *Holocnemus pluchei* (Scopoli, 1763), *Dactylopisthes digiticeps* (Simon, 1881), *Walckenaeria alticeps* (Denis, 1952), *Pachygnatha listeri* Sundevall 1830, *Liocranoeca striata* (Kulczyński, 1882), *Phrurolithus minimus* C. L. Koch, 1839 and *Tibellus maritimus* (Menge, 1875), dok 59 vrsta predstavlja prve nalaze za rezervat. Pored nove liste vrsta, u radu su malo detaljnije komentarisani i novi nacionalni nalazi.

Impact of prescribed burning on a heathland inhabiting spider community

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Abstract. Heathlands can provide refuge for many stenotopic and endangered arthropods, if habitat management practices are applied. A management measure that is rarely being used today, but which has the potential to support diversity of arthropod communities, is prescribed burning. In this study we investigated the effects of prescribed burning on spider assemblages on a burned site with *Calluna vulgaris* in the nature reserve Lueneburg Heath, northwest Germany. We used pitfall trapping with a sampling design of 39 traps over a period of one year and 17 sampling intervals on a burned and a control site. We compared overall species richness, activity abundance patterns and community composition of the two sites, with a particular focus on stenotopic and endangered species. We collected 5116 adult spiders and 99 species altogether in a relatively small sampling area. This number of species represents nearly one third of the regional species pool of heathland spider species. Twelve species occurred exclusively on the burned site in contrast to 28 species exclusively found on the unburned site. Although we found more than twice as many spider individuals and higher mean species richness on the control site than on the burned site, the species richness of red-listed spiders was higher on the burned site. Especially the fact that we found 24 endangered species on the burned site and only 20 on the control site indicates that the applied measure of prescribed burning can foster certain endangered spider species and contribute to preserving the overall biodiversity of heathland ecosystems.

Keywords: endangered species, habitat management, Nature Reserve Lueneburg Heath (Lüneburger Heide), pitfall trapping, species richness

Zusammenfassung. Auswirkungen von kontrolliertem Brennen auf eine Heide bewohnende Spinnengesellschaft. Heidelandschaften können als Refugium für viele stenotope und gefährdete Arthropodenarten fungieren, wenn ein bestimmtes Heidemanagement angewandt wird. Eine Managementmaßnahme, die zwar heute selten praktiziert wird, obwohl sie sich positiv auf die Diversität von Arthropodengesellschaften auswirkt, ist kontrolliertes Brennen. In dieser Arbeit untersuchen wir die Auswirkungen von kontrolliertem Brennen auf eine Spinnenzönose einer mit *Calluna vulgaris* bestandenen Brandfläche im Naturschutzgebiet Lüneburger Heide in Nordwestdeutschland. Die Spinnen wurden in 39 Bodenfallen über einen Zeitraum von einem Jahr mit 17 Fallenleerungen auf der gebrannten und einer Kontrollfläche gefangen. Wir vergleichen die Artenvielfalt, die Individuenhäufigkeit und die Zusammensetzung der Spinnengemeinschaft der beiden Flächen miteinander. Wir fingen 5116 adulte Spinnenindividuen mit 99 Arten auf einer verhältnismäßig kleinen Probefläche. Diese Anzahl der Spinnenarten stellt fast ein Drittel des regionalen Artenpools der Heidespinnenarten dar. Wir fanden zwölf Arten ausschließlich auf der gebrannten und 28 ausschließlich auf der ungebrannten Fläche. Obwohl die durchschnittliche Artenzahl größer und die Gesamtzahl der Individuen fast doppelt so hoch auf der Kontrollfläche war, war dennoch die Artenvielfalt der gefährdeten Arten auf der gebrannten Fläche höher als auf der ungebrannten. Allein die Tatsache, dass wir insgesamt 24 gefährdete Arten auf der gebrannten Fläche und nur 20 gefährdete Arten auf der Kontrollfläche fanden, weist darauf hin, dass die angewandte Maßnahme des kontrollierten Brennens bestimmte Spinnenarten fördern und zur Erhaltung der Biodiversität der Heideökosysteme beitragen kann.

While the vascular plant community of heathlands seems to be rather poor in species numbers, the arthropod fauna of these habitats is rich in species, especially in stenotopic ones (e.g. Schikora & Fründ 1997, Finch 2013). The composition of the faunal communities and especially the occurrence of stenotopic species of heathlands seem to be strongly affected by the different habitat management practices that are applied (esp. choppering, sod-cutting, grazing, mowing, and burning) (see e.g. Gardner 1991). During historical times, north-west German heathlands were used by a diverse mixture of historical forms of land use. A consequence of these land use practices was that the development cycle of the dominant vascular plant species, the common heather (*Calluna vulgaris*) started consistently from seedlings or (re-)sproutings. The senescent stage with tall, strongly woody and sparsely foliated heather individuals was very rare during former centuries (Gimingham 1972, Keienburg & Prüter 2004). In contrast, nowadays this stage is widely distributed in heathlands due to abandoned land use, and species that were formerly promoted by habitat conditions of early successional heather stages might be detrimentally affected by this development in heather management.

Prescribed burning, a historically frequently used habitat measure by shepherds is only rarely used nowadays to rejuvenate heather. The effects of this management practice on animals, especially on protected or heathland typical species, is controversially discussed. For reptiles, the benefits of prescribed burning are not well understood (Jofré & Reading 2012) and prescribed burning is considered to be least harmful during winter when most of the reptiles are hidden in the ground where they are protected against the fire. For arthropods, however, benefits from prescribed burning have been demonstrated in several cases (e.g. some stenotopic ground beetles appear more abundantly about 2 or 3 years after prescribed burning; den Boer & van Dijk 1994). However, there are only a few studies on the effect of prescribed burning on the spider community of heathlands which are remarkably rich in species (Kaiser 2013). Moreover some endangered spider species are known to occur preferentially on burned sites (Schmidt & Melber 2004) and might even depend on this habitat management practice. Many spider species are known to react sensitively to habitat structures (Uetz 1990) which are also altered by prescribed burning. In contrast ground dwelling spider species are not very much affected by fire in general (prescribed and wild fire) as the temperatures at depths of 4 cm depth are not changed more than 2 °C and even at 1–2 cm depth do not exceed 40–50 °C for a very short timeframe depending on the season and the local soil conditions (Gerland 2004). In combination with other management practices, prescribed burning might thus create a heterogeneous complex of different habitats and habitat structures that could promote not only endangered species, but overall biodiversity as well.

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Fig. 1: The study area showing the unburned (left) and the burned site (right) one and a half years after burning during the sampling period (March 2008)

The advantages to apply different habitat management practices are also understood by political authorities and local conservation associations. Despite the high costs of some measures as e.g. choppering, some institutions are willing to manage heathlands also with prescribed burning (Lütkepohl 1993) provided that endangered animals of heathlands benefit from this specific heathland practice. Reliable data are scarce, however, and more research on the effects of prescribed burning on arthropods is needed.

Here, we studied the spider fauna of a heathland site one year after prescribed burning and compare spider richness, abundance and assemblage composition patterns to an unburned control site. The main questions of our study were: (1) To what extent does prescribed heathland burning affect the abundance and distribution of spider species, in particular of endangered species? (2) Is there any evidence that individual species benefit from prescribed burning, and is it possible to infer how such species reach the burned study site? (3) Can prescribed burning be considered an appropriate measure to foster endangered spider species and the biodiversity of the spider community in lowland heathlands?

Material and methods

Study area. The study site is situated in the nature reserve Lüneburger Heide (Lueneburg Heath) about 8 km east of Schneverdingen, Lower Saxony, Germany. The nature reserve includes the largest heathlands of north-west Germany, covering approximately 5000 ha, and is protected by the European Habitats and Species Directive as a Natura 2000 site. Its climate is humid, suboceanic with mean annual precipitation of 811 mm and a mean annual temperature of 8.4 °C (Niemeyer et al. 2007). Soils are predominantly nutrient-poor podzols with low pH values of 3.2 - 3.6.

The study area itself (53°15'N; 09°58'E; 105 m a.s.l., Niemeyer et al 2006) (Fig. 1) is slightly sloping to the south and consisted of two parts: 1. The unburned site with approximately ten year old heather of about 50 cm height; 2. the burned site covering an oblong of 220 x 200 m surrounded by the unburned area. Prescribed burning took place in autumn 2006, one year before we started to carry out our study.

Sampling design. We installed a total of 39 pitfall traps, filled with a mixture of 50 % ethanol, 20 % glycerol and 30 % water (Renner 1982), along a transect with 20 pitfalls across the burned site and 19 pitfalls along the edges in the unburned heather, 10 m apart from the burned site. Pitfall trapping represents the most efficient method for capturing ground-dwelling spiders, especially for locomotory active spider species (Curtis 1980, Southwood & Henderson 2000).

The pitfall traps were set up on 14th August and the catching period was extended over the length of twelve months beginning on 28th August 2007 and ending on 14th August 2008. The capturing periods in August 2007 and August 2008 each lasted only half a month. The traps were emptied once per month during the winter and fortnightly during the summer, resulting in a total of 17 sampling intervals.

Only adult spiders were identified using the online spider guide of Nentwig et al. (2014). Taxonomy follows the World Spider Catalog (2015).

Habitat characteristics. Vegetation data was gathered within a circle of 100 cm diameter around each trap. We visually estimated the percentage cover of *Calluna vulgaris*, grasses, lichens, mosses, trees, and bare soil in three layers: a) 0–5 cm, b) 5–50 cm, c) over 50 cm. Additionally for measuring the pH-value we took 20 samples of approximately 0.5 L with a spade every three months from randomly chosen plots in the burned (n =1 0) and unburned site (n = 10).

Statistical analysis. Differences between the burned and unburned site were analysed with t-tests. Homogeneity of variances was checked prior to the analyses. Differences in the composition of the spider assemblages of the burned and unburned plots were analyzed using non-metric multidimensional scaling (NMDS; vegan package in R; Oksanen et al. 2013). The NMDS was based on abundance-weighted dissimilarities in spider assemblages among the 39 pitfall traps, using the Morisita-Horn index on square-root transformed abundance data. A stable solution with k = 2 dimensions was computed from multiple random starting configurations. Results were centred and principal components rotation was used to obtain maximum variance of points on the first dimension. The relationship with environmental factors was assessed by fitting habitat parameters (after standardization) to the ordination plot on the basis of a regression analysis with the NMDS axes scores. Significance of the correlations

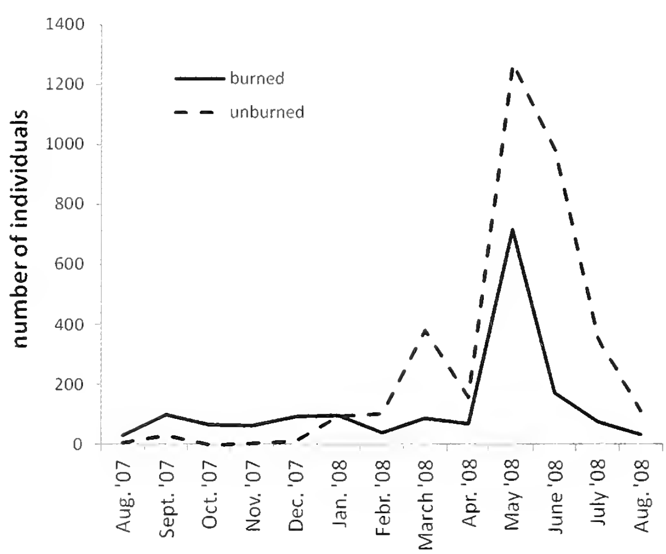


Fig. 2: Seasonal dynamics of spider activity abundance in the burned and unburned sites

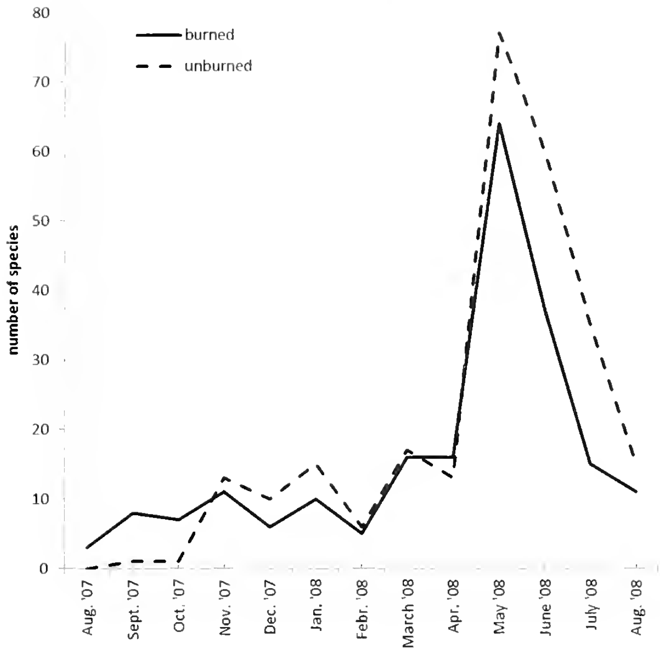


Fig. 3: Seasonal dynamics of spider species richness in the burned and unburned sites

was assessed with permutation tests (N = 1000). All analyses were conducted with R 3.0.2 (http://www.R-project.org/package=vegan).

Results

We found 3175 spider individuals on the unburned and 1941 on the burned site. Consequently, we captured 5116 adult spiders in total (Fig. 2), of which 3621 were males and 1495 were females, belonging to 99 spider species. Twenty-eight of them are red-listed species of Lower Saxony (Finch 2004), of which seven are classified as 'highly endangered', 19 as 'endangered' and one as 'increasingly endangered', and one is not listed yet in the list of Finch (2013) but regarded 'endangered' in the

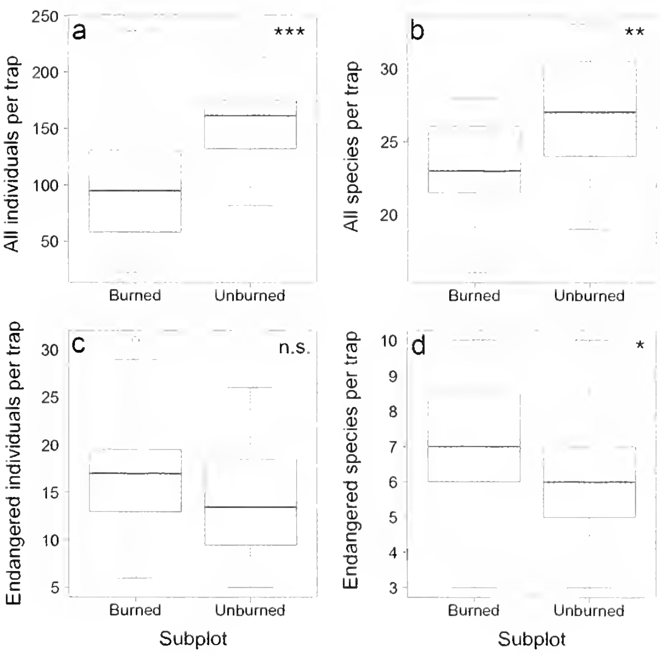


Fig. 4: Mean species activity abundance and richness for the burned (left) and unburned site (right). **a.** = all individuals, **b.** species per trap over the whole period; **c.** and **d.** show the results for endangered spiders. * = p < 0,05; ** = p < 0,01; *** = p < 0,001

list of Platen & Broen (2005) (Tab. 3). On the unburned plot, we found 28 species active only in this plot with only 3 species on the Red List of Lower Saxony. 20 species were active in at least double numbers on this site in comparison with the burned plot. In contrast, 12 species occurred exclusively in the burned plot of which six species are listed in the Red List (Tab. 1), and 10 species were twice as active on the burned site than on the unburned site (Tab. 2). It should be noted, however, that most of the exclusive species were recorded in low abundances (e.g., five out of the 12 exclusive species in the burned plot were singletons).

Altogether we found 20 endangered species in the unburned and 24 endangered species in the burned plot with overlapping patterns of 16 species. Three further endangered species are heather specialists according to Roberts (1995): *Neriene furtiva* (O. Pickard-Cambridge, 1871) (Linyphiidae), *Ozyptila scabricula* (Westring, 1851) (Thomisidae) and *Steatoda albomaculata* (De Geer, 1778) (Theridiidae).

Pardosa monticola (Clerck, 1757) (Lycosidae) was the most abundant species with a total number of 1007 individuals, whereas 24 species occurred as only one individual. *Theridion uhligi* Martin, 1974 was recorded for the first time in Lower Saxony and occurred only on the burned site with six specimens. The highest peak of activity was in May with 2498 specimens and the lowest in October with only 12 individuals (Fig. 2). Nearly throughout the whole period we found more individuals in the unburned than in the burned site. Only from September till December was this proportion inverted with extremely low total numbers. We found similar effects regarding the distribution of species with the highest peak in May and the lowest in September and October (Fig. 3).

The mean number of individuals per trap ($t = 3.67$, $DF = 32.992$ $P < 0.001$) and the mean number of species per trap ($t = 3.13$, $DF = 36.812$, $P = 0.003$) was higher on the unburned site (cf. Fig. 4a, 4b). In contrast, red-listed species were more species-rich on the burned site ($t = 2.27$, $DF = 36.572$, $P = 0.029$), whereas the mean number of individuals per trap of the endangered species did not significantly differ between the burned and unburned area ($t = 1.52$ $DF = 35.275$, $P = 0.136$) (Fig. 4c, 4d). In total we found 24 red-listed species on the burned site and 20 endangered species on the unburned one, while there is an overlap of 16 species between the two sites.

The mean value of body size was determined for all species using figures given in the literature (Hänggi et al. 1995, Roberts 1995) ($t = -1.4741$, $df = 34.442$, p-value = 0.1495). We found that the results did not differ significantly between the burned and the unburned site.

NMDS-analysis showed a clear separation in overall spider species composition between the burned and unburned area. This separation was correlated with the strong differences in the cover of heath and bare soil (Fig. 5a). Red List species showed a similar separation between the two sites (Fig. 5b).

Discussion

Finch (2004) listed 675 species altogether for Lower Saxony and Bremen (Germany) of which 86 are classified as highly endangered and 100 as endangered. The list of spider species for north German heathlands by Finch (2013) contains 360 species. We found 99 species on our study site, with seven

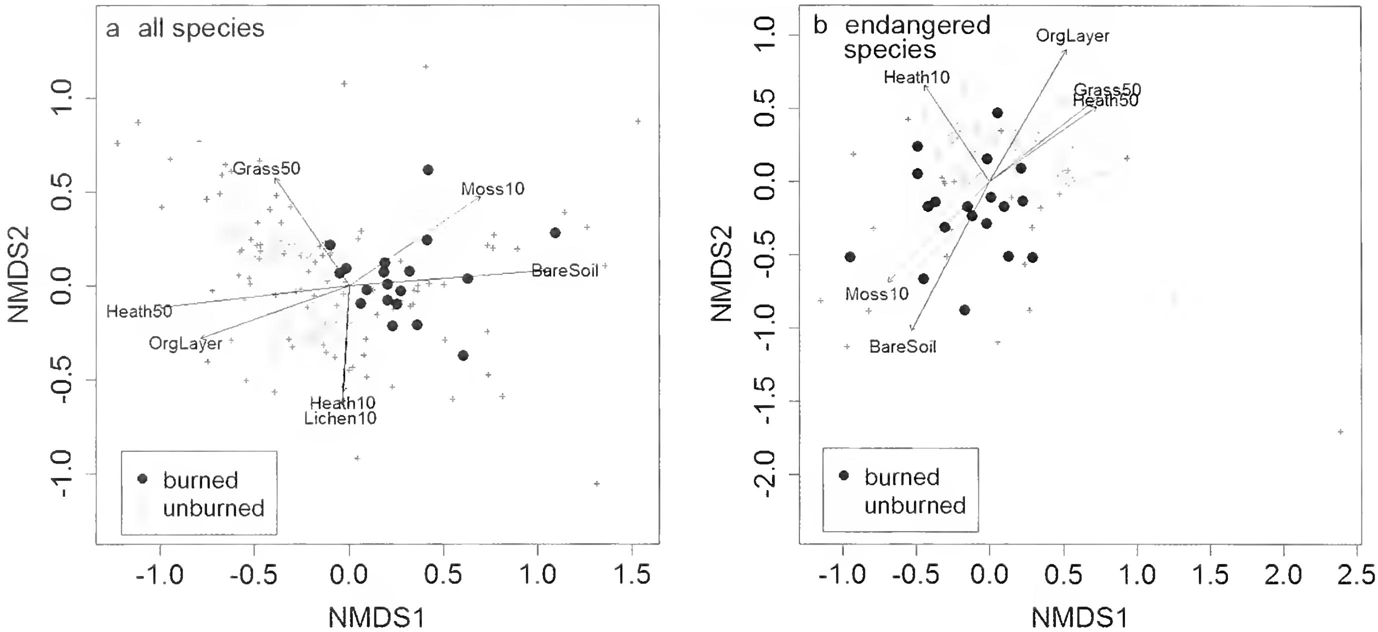


Fig. 5: Relationship between spider species and habitat components **a.** all species, **b.** red list species. Light spots = pitfall catches on unburned area; dark spots = pitfall catches on burned area. Crosses = species. Heath 10 = heather <10 cm; Heath50 = heather 10–50 cm; Moss10 = mosslayer < 10 cm; Grass50 = Grasses 10–50 cm

species highly endangered and 19 species endangered. This total number of recorded species – nearly one third of all known species in the Lüneburg Heath – appears as high species richness against the background of the relatively small size of the investigated site. Among the three species which are classified as heather specialists *Ozyptila scabricula* (Thomisidae) and *Steatoda albomaculata* (Theridiidae) are known to appear especially in burned areas (Roberts 1995), and our results confirm that these species may especially profit from the measure of prescribed burning.

The fact that we found more than a doubled activity density on the unburned site than on the burned site was to be

Tab. 1: Species and individuals occuring exclusively on the burned site (nl = not listed)

Species	Family	unburned	burned	red list	woodland	open landsc.	heath	ballooning	thermo-phil
Aelurillus v-insignitus	Salticidae	0	2	3	0	1	0	0	1
Araneus quadratus	Araneidae	0	3	-	0	1	0	0	0
Arctosa perita	Lycosidae	0	2	3	0	1	1	1	1
Centromerus arcanus	Linyphiidae	0	4	3	0	1	0	0	0
Clubiona corticalis	Clubionidae	0	1	-	1	0	0	0	0
Dicymbium tibiale	Linyphiidae	0	1	-	1	1	0	0	0
Drassyllus praeficus	Gnaphosidae	0	1	3	0	1	0	1	1
Hypsosinga albovittata	Araneidae	0	1	3	0	1	0	1	1
Neoscona adianta	Araneidae	0	1	-	0	1	1	0	1
Palliduphantes pallidus	Linyphiidae	0	2	-	1	1	0	0	0
Theridion uhligi	Theridiidae	0	6	nl	0	1	0	1	1
Trichopterna cito	Linyphiidae	0	3	3	0	1	0	1	1

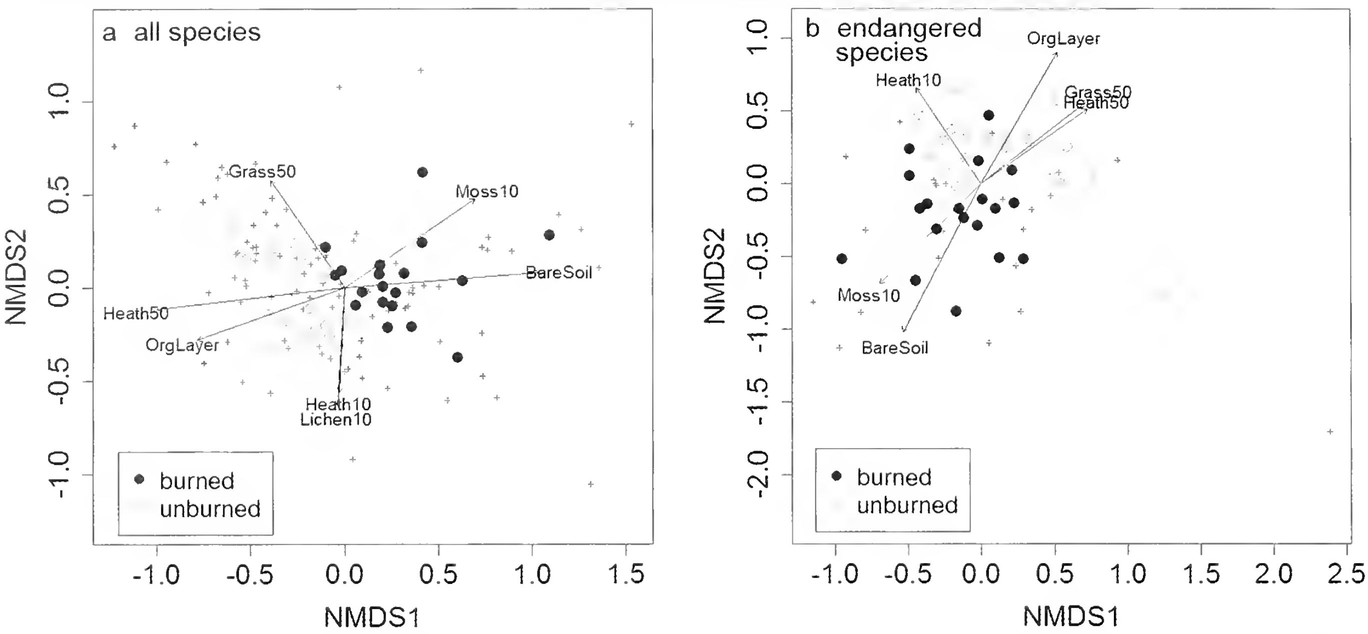
Tab. 2: Species and individuals occurring at least twice as much on the burned site than on the unburned site

Species	Family	n = unburned	n = burned	red list	wood-land	open landsc.	heath	ballooning	thermo-phil
Alopecosa barbipes	Lycosidae	10	37	3	0	1	0	1	1
Cheiracanthium erraticum	Eutichuridae	1	2	-	0	1	0	0	1
Cheiracanthium virescens	Eutichuridae	2	4	-	0	1	0	0	1
Erigone atra	Linyphiidae	8	22	-	0	1	0	1	1
Erigone dentipalpis	Linyphiidae	9	23	-	0	1	1	1	1
Micaria silesiaca	Gnaphosidae	4	23	2	0	1	1	1	1
Pardosa monticola	Lycosidae	336	671	-	0	1	0	1	0
Steatoda albomaculata	Theridiidae	1	18	3	0	1	1	0	1
Talavera aequipes	Salticidae	2	5	3	1	0	0	0	1
Walckenaeria dysderoides	Linyphiidae	3	6	-	1	1	1	0	1

Tab. 3: List of spider species captured on the unburned and on the burned site

Species	Family	un-burned	burned
Aelurillus v-insignitus	Salticidae		2
Agelena labyrinthica	Agelenidae	4	2
Agroeca lusatica	Liocranidae	5	3
Agroeca proxima	Lycosidae	17	11
Alopecosa barbipes	Lycosidae	10	37
Alopecosa cuneata	Lycosidae	201	79
Alopecosa fabrilis	Lycosidae	5	8
Alopecosa pulverulenta	Lycosidae	12	2
Araneus quadratus	Araneidae		3
Arctosa perita	Lycosidae		2
Asagena phalerata	Theridiidae	55	97
Centromerita bicolor	Linyphiidae	11	7
Centromerita concinna	Linyphiidae	703	218
Centromerus arcanus	Linyphiidae		4
Centromerus incilium	Linyphiidae	27	6
Centromerus prudens	Linyphiidae	5	1
Centromerus sylvaticus	Linyphiidae	88	31
Cercidia prominens	Araneidae	1	
Cheiracanthium erraticum	Eutichuridae	1	2
Cheiracanthium virescens	Eutichuridae	2	4
Clubiona corticalis	Clubionidae		1
Clubiona diversa	Clubionidae	2	
Clubiona subsultans	Clubionidae	1	
Cnephalocotes obscurus	Linyphiidae	1	1
Coriarachne depressa	Thomisidae	1	1
Dicymbium tibiale	Linyphiidae		1
Dismodicus elevatus	Linyphiidae	1	
Drassodes cupreus	Gnaphosidae	9	1
Drassodes pubescens	Gnaphosidae	14	9
Drassyllus praeficus	Gnaphosidae		1
Drassyllus pusillus	Gnaphosidae	4	1
Enopognatha thoracica	Theridiidae	2	1
Erigone atra	Linyphiidae	8	22
Erigone dentipalpis	Linyphiidae	9	23
Ero furcata	Mimetidae	2	
Euophrys frontalis	Salticidae	3	
Gnaphosa leporina	Gnaphosidae	7	1
Gonatium rubens	Linyphiidae	1	
Hahnia helveola	Hahniidae	2	4
Haplodrassus signifer	Gnaphosidae	121	65
Heliophanus flavipes	Salticidae	1	
Hygrolycosa rubrofasciata	Lycosidae	1	
Hypsosinga albovittata	Araneidae		1
Macrargus rufus	Linyphiidae	1	
Micaria silesiaca	Gnaphosidae	4	23
Micrargus herbigradus	Linyphiidae	1	
Neoscona adianta	Araneidae		1
Neriene furtiva	Linyphiidae	1	
Oedothorax apicatus	Linyphiidae	1	
Ozyptila atomaria	Thomisidae	10	12
Ozyptila scabricula	Thomisidae	3	1
Pachygnatha degeeri	Tetragnathidae	2	1
Palliduphantes pallidus	Linyphiidae		2
Pardosa amentata	Lycosidae	1	1
Pardosa lugubris	Lycosidae	1	
Pardosa monticola	Lycosidae	336	671
Pardosa nigriceps	Lycosidae	127	22
Pardosa palustris	Lycosidae	147	111
Pardosa pullata	Lycosidae	339	36
Pellenes tripunctatus	Salticidae	18	28
Philodromus aureolus	Philodromidae	4	
Philodromus collinus	Philodromidae	2	
Phlegra fasciata	Salticidae	1	1
Phrurolithus festivus	Phrurolithidae	3	2
Pisaura mirabilis	Pisauridae	97	6
Pocadicnemis juncea	Linyphiidae	1	
Robertus lividus	Theridiidae	4	4
Scotina palliardii	Liocranidae	5	2
Steatoda albomaculata	Theridiidae	1	18
Stemonyphantes lineatus	Linyphiidae	14	13
Talavera aequipes	Salticidae	2	5
Talavera petrensis	Salticidae	2	
Tenuiphantes tenuis	Linyphiidae	1	
Theridion uhligi	Theridiidae		6
Theridion varians	Theridiidae	2	
Tibellus oblongus	Philodromidae	5	2
Tiso vagans	Linyphiidae	3	
Trichopterna cito	Linyphiidae		3
Trochosa ruricola	Lycosidae	1	
Trochosa terricola	Lycosidae	399	130
Walchenaeria cucullata	Linyphiidae	1	
Walckenaeria acuminata	Linyphiidae	12	
Walckenaeria atrotibialis	Linyphiidae	1	
Walckenaeria capito	Linyphiidae	1	
Walckenaeria dysderoides	Linyphiidae	3	6
Walckenaeria furcillata	Linyphiidae	7	4
Walckenaeria monoceros	Linyphiidae	31	7
Xerolycosa nemoralis	Lycosidae	4	5
Xysticus audax	Thomisidae	1	
Xysticus bifasciatus	Thomisidae	18	17
Xysticus cristatus	Thomisidae	29	23
Xysticus erraticus	Thomisidae	23	13
Xysticus kochi	Thomisidae	11	18
Zelotes electus	Gnaphosidae	1	4
Zelotes latreillei	Gnaphosidae	24	3
Zelotes longipes	Gnaphosidae	24	38
Zelotes petrensis	Gnaphosidae	99	50
Zelotes subterraneus	Gnaphosidae	2	
Zora spinimana	Miturgidae	7	
Total: 99 species		**3175**	**1941**
Total number of specimen			**5116**

expected and has also been found in similar studies that analyzed the impact of prescribed burning on spiders in other habitats (e.g. Gerland 2004, Koponen 2005). However, such studies in part also reported that the species richness of spiders was actually higher on the burned sites (Koponen 2005). Despite the fact that 28 species were captured exclusively on the unburned site (emphasizing the value for biodiversity conservation also of unburned heathland) only three of them were endangered, whereas out of the twelve species recorded exclusively on the burned plot, six were red-list species. While the comparison with the results of our study is limited by the



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Arctosa perita	Lycosidae	0	2	3	0	1	1	1	1
Centromerus arcanus	Linyphiidae	0	4	3	0	1	0	0	0
Clubiona corticalis	Clubionidae	0	1	-	1	0	0	0	0
Dicymbium tibiale	Linyphiidae	0	1	-	1	1	0	0	0
Drassyllus praeficus	Gnaphosidae	0	1	3	0	1	0	1	1
Hypsosinga albovittata	Araneidae	0	1	3	0	1	0	1	1
Neoscona adianta	Araneidae	0	1	-	0	1	1	0	1
Pallidiphantes pallidus	Linyphiidae	0	2	-	1	1	0	0	0
Theridion uhligi	Theridiidae	0	6	nl	0	1	0	1	1
Trichopterna cito	Linyphiidae	0	3	3	0	1	0	1	1

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Cheiracanthium virescens	Eutichuridae	2	4	-	0	1	0	0	1
Erigone atra	Linyphiidae	8	22	-	0	1	0	1	1
Erigone dentipalpis	Linyphiidae	9	23	-	0	1	1	1	1
Micaria silesiaca	Gnaphosidae	4	23	2	0	1	1	1	1
Pardosa monticola	Lycosidae	336	671	-	0	1	0	1	0
Steatoda albomaculata	Theridiidae	1	18	3	0	1	1	0	1
Talavera aequipes	Salticidae	2	5	3	1	0	0	0	1
Walckenaeria dysderoides	Linyphiidae	3	6	-	1	1	1	0	1

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Araneus quadratus	Araneidae		3
Arctosa perita	Lycosidae		2
Asagena phalerata	Theridiidae	55	97
Centromerita bicolor	Linyphiidae	11	7
Centromerita concinna	Linyphiidae	703	218
Centromerus arcanus	Linyphiidae		4
Centromerus incilium	Linyphiidae	27	6
Centromerus prudens	Linyphiidae	5	1
Centromerus sylvaticus	Linyphiidae	88	31
Cercidia prominens	Araneidae	1	
Cheiracanthium erraticum	Eutichuridae	1	2
Cheiracanthium virescens	Eutichuridae	2	4
Clubiona corticalis	Clubionidae		1
Clubiona diversa	Clubionidae	2	
Clubiona subsultans	Clubionidae	1	
Cnephalocotes obscurus	Linyphiidae	1	1
Coriarachne depressa	Thomisidae	1	1
Dicymbium tibiale	Linyphiidae		1
Dismodicus elevatus	Linyphiidae	1	
Drassodes cupreus	Gnaphosidae	9	1
Drassodes pubescens	Gnaphosidae	14	9
Drassyllus praeficus	Gnaphosidae		1
Drassyllus pusillus	Gnaphosidae	4	1
Enopognatha thoracica	Theridiidae	2	1
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Erigone dentipalpis	Linyphiidae	9	23
Ero furcata	Mimetidae	2	
Euophrys frontalis	Salticidae	3	
Gnaphosa leporina	Gnaphosidae	7	1
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Hahnia helveola	Hahniidae	2	4
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Hygrolycosa rubrofasciata	Lycosidae	1	
Hypsosinga albovittata	Araneidae		1
Macrargus rufus	Linyphiidae	1	
Micaria silesiaca	Gnaphosidae	4	23
Micrargus herbigradus	Linyphiidae	1	
Neoscona adianta	Araneidae		1
Neriene furtiva	Linyphiidae	1	
Oedothorax apicatus	Linyphiidae	1	
Ozyptila atomaria	Thomisidae	10	12
Ozyptila scabricula	Thomisidae	3	1
Pachygnatha degeeri	Tetragnathidae	2	1
Palliduphantes pallidus	Linyphiidae		2
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Stemonyphantes lineatus	Linyphiidae	14	13
Talavera aequipes	Salticidae	2	5
Talavera petrensis	Salticidae	2	
Tenuiphantes tenuis	Linyphiidae	1	
Theridion uhligi	Theridiidae		6
Theridion varians	Theridiidae	2	
Tibellus oblongus	Philodromidae	5	2
Tiso vagans	Linyphiidae	3	
Trichopterna cito	Linyphiidae		3
Trochosa ruricola	Lycosidae	1	
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Walckenaeria acuminata	Linyphiidae	12	
Walckenaeria atrotibialis	Linyphiidae	1	
Walckenaeria capito	Linyphiidae	1	
Walckenaeria dysderoides	Linyphiidae	3	6
Walckenaeria furcillata	Linyphiidae	7	4
Walckenaeria monoceros	Linyphiidae	31	7
Xerolycosa nemoralis	Lycosidae	4	5
Xysticus audax	Thomisidae	1	
Xysticus bifasciatus	Thomisidae	18	17
Xysticus cristatus	Thomisidae	29	23
Xysticus erraticus	Thomisidae	23	13
Xysticus kochi	Thomisidae	11	18
Zelotes electus	Gnaphosidae	1	4
Zelotes latreillei	Gnaphosidae	24	3
Zelotes longipes	Gnaphosidae	24	38
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expected and has also been found in similar studies that analyzed the impact of prescribed burning on spiders in other habitats (e.g. Gerland 2004, Koponen 2005). However, such studies in part also reported that the species richness of spiders was actually higher on the burned sites (Koponen 2005). Despite the fact that 28 species were captured exclusively on the unburned site (emphasizing the value for biodiversity conservation also of unburned heathland) only three of them were endangered, whereas out of the twelve species recorded exclusively on the burned plot, six were red-list species. While the comparison with the results of our study is limited by the

fact that Koponen (2005) studied the effect of burning on spiders in forests, our findings indicate that prescribed burning in heathland systems might show dynamics that differ from those of other systems and might require separate analysis.

There are several possibilities for how these 12 species occurring invariably on the burned site might have colonized this plot. The next burned area to our study site is approximately 100 m apart from our burned plot. It was burned only two years earlier. It is less likely that these spiders crossed the matrix of older heather lying in between these sites on the ground, as they could not be proved on the adjoining unburned site. Another way of reaching the study site may be ballooning. Koponen (2005) assumed that a certain amount of species reached the burned site in his study by ballooning. Among the species being predominant on the burned site in our study, we found altogether 10 species that are known to use ballooning (Bell et al. 2005). Thus we can assume that mobile taxa such as spiders, similar to many insects with the ability to fly, can recolonize suitable heathland habitats created by specific management practices such as prescribed burning (or stochastic events such as wild fires, which infrequently occur also in the studied heathlands and which might contribute to explain why species adapted to burned sites are able to persist in the absence of prescribed burning) via dispersal over longer distances. They might thus benefit from these management practices even when only applied locally and in smaller patches within a mosaic of differently managed heathland habitats. We note that many of the species recorded exclusively on only one of the two plots were recorded in low abundances. The limitations regarding replication of burned and unburned plots due to lack of further suitable study plots thus make it difficult to verify whether all of these species were established but rare on the plots, or whether some species were accidentally recorded vagrants (the latter of which is likely at least for the three web-building Araneidae on the burned plot).

Nevertheless, the results indicate that burned areas may provide a refuge for certain endangered species, considering that several other endangered species that were altogether more abundant and classified as heathland specialists were recorded in much higher abundance on the burned than the unburned plot. Schmidt & Melber (2004) investigated the impact of winter burning in heathlands on spider assemblages and found that thermophilic species showed a positive effect on this kind of burning. In our study, several of the spider species being found preferentially on the burned site also tended to be thermophilic (Roberts 1995, Nentwig et al. 2014, British Arachnological Society 2015). It is notable that many endangered species seemed to be fostered by burning. This management practice probably creates specific habitat conditions that are less readily available in the surrounding heather and that meet the requirements of several of these species. Prescribed burning on a smaller scale achieves a high heterogeneity of vegetation structure, which is known to promote high species diversity of arthropods and may thus create suitable habitats for species that would not be present in a more uniform landscape. In this sense prescribed burning, in combination with other management practices, can be regarded as an appropriate measure for species specialized on plots like our study site to maintain a part of the spider fauna of the Atlantic lowland heathlands. Presumably other thermophilic arthropod species can benefit from this heathland measure as well. While our study design limits our ability for generalizations beyond our study system, the results nevertheless show the need for, and hopefully stimulate, more intensive research of landscape management practices in heathland ecosystems to develop efficient ways for promoting and conserving heathland biodiversity.

Acknowledgements

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The case history of a toxic sting of a *Leiurus abdullahbayrami* scorpion in Turkey

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Abstract. Scorpion stings are very common in Turkey. Nevertheless, they are not well documented in the literature and were never reported for the recently described scorpion species *Leiurus abdullahbayrami* Yağmur, Koç & Kunt, 2009. Here, we report a case in which a 30-year-old male was stung by a *L. abdullahbayrami* scorpion in the field. He was directly brought to the emergency department of the local hospital. The symptomatic process was observed and documented. In this case, no antivenom was necessary; we hypothesize that the scorpion has used most of its venom in a previous incident (explained in further detail below) and was therefore not able to inject a normal dosage.

Keywords: Scorpion sting, south-eastern Anatolia, symptomatic process

Zusammenfassung. Der klinische Verlauf eines giftigen Stiches des Skorpions *Leiurus abdullahbayrami* in der Türkei. Skorpionstiche kommen in der Türkei häufig vor. Dennoch sind sie nur wenig in der Literatur dokumentiert und es war noch kein Stich des erst vor wenigen Jahren beschriebenen Skorpions *Leiurus abdullahbayrami* Yağmur, Koç & Kunt, 2009 bekannt. Wir berichten über den Stich eines 30-jährigen Mannes in der freien Natur und über seine medizinische Behandlung. Er wurde direkt in ein nahe gelegenes Krankenhaus gebracht. Der symptomatische Verlauf wurde beobachtet und dokumentiert; von der Verabreichung eines Gegengiftes wurde abgesehen. Wir vermuten, dass der Skorpion kurz vorher eine große Giftmenge abgegeben hat (wird im Detail erläutert) und daher nicht in der Lage war eine normale Giftmenge zu injizieren.

Scorpions (Scorpiones) belong to the class Arachnida and have a near worldwide distribution. They can be easily distinguished from other arthropods by their morphological structures (Polis 1990). All scorpion species bear a venom gland and are able to sting, but only a handful of them are potentially lethal to humans. As their venom can have lifelong consequences for humans (i.e. respiratory and/or cardiovascular diseases) they are considered as medically important arthropods (e.g. Dittrich et al. 1995, Hisham 1997). Species of medical importance are all found within two families, Buthidae and Hemiscorpiidae, but are spread over several genera: *Androctonus*, *Buthus*, *Centruroides*, *Leiurus*, *Mesobuthus*, *Parabuthus*, *Tityus* and *Hemiscorpius*. Their distribution covers Central and South America (incl. Mexico), the Middle East, northern Africa and southern Africa (e.g. Adıguzel 2010, Adolfo et al. 2003, Borges et al. 2012, Pardal et al. 2014, Pipelzadeha et al. 2007, Reckziegel & Pinto 2014).

Scorpion stings are a common occurrence in Turkey. The majority of them are known from the Antalya, Kahramanmaraş, Mersin and Hatay Provinces in the Mediterranean region. However, deaths have been rarely documented and, when occurring, were due to cardiovascular and respiratory failure within the first 24 hours of hospitalization (Ozkan et al. 2007). In south-eastern Anatolia, seven scorpion species from the family Buthidae are known: *Androctonus crassicauda*, *Buthacus macrocentrus*, *Compsobuthus matthiesseni*, *Hottentotta saulcyi*, *Leiurus abdullahbayrami* (*L. abdullahbayrami* was previously identified as *L. quinquestriatus* in Turkey and was classified as a new species by Yağmur et al. 2009), *Mesobuthus phillipsii* and *Mesobuthus nigrocinctus*. Of these seven, three have been considered dangerous to humans: *A. crassicauda*, *L. abdullahbayrami* and *H. saulcyi* (Ozkan & Kat 2005, Ozkan et al. 2006, 2011).

The species in our case report is *L. abdullahbayrami*, which is only distributed in Turkey and Syria (Yağmur et al. 2009, Khalil & Yağmur 2010). In a recent study, Ozkan et al. (2011) documented the lethality and biological effects of *L. abdullahbayrami* scorpion venom in mice. They reported the median lethal dose of the venom to be 0.19 mg/kg (LD_{50}) by subcutaneous injection in mice (Ozkan et al. 2011). By comparison, the median lethal dose of *L. quinquestriatus* – previously considered the most lethal species for mice – is 0.25 mg/kg (Watt & Simard 1984).

Here we present a detailed progression of symptoms in a 30 year-old man from Central Europe after envenomation by an adult *L. abdullahbayrami* female. This report is the first documented envenomation from the most toxic scorpion species known to science.

Case report

A 30-year-old male was stung by a scorpion in south-eastern Anatolia (c/o Küplüce in Kilis Province, close to the Syrian border) on 06. September 2014 at 9:30 p.m. in the tip of the right thumb. Afterwards, the scorpion was caught and was brought to the laboratory for identification, where it was confirmed to be an adult *L. abdullahbayrami* female, which is now deposited in the collection of the Natural History Museum Vienna (Fig. 1). The event took place at night, approximately 12 kilometres away from the nearest hospital. The habitat was typical for this scorpion species (Fig. 2) and has been documented before (Yağmur et al. 2009). Within 20 minutes, the person was brought to the emergency department in Kilis.

Upon arrival, the patient complained of severe local pain spreading from his right thumb (Fig. 3). He was very calm and showed no sign of abnormal blood pressure and pulse. The patient was a smoker and there is no history of hypertension or cardiac diseases in the recent family tree. It is worth mentioning that this scorpion specimen was previously inadvertently damaged by turning a stone.

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Fig. 1: *Leiurus abdullahbayrami*, adult female from Kilis Province in Turkey

Fig. 2: Envenomation locality in Kilis Province close to the Syrian border

Fig. 3: Sting site at the time the patient was monitored in hospital after one hour of envenomation. White rectangle shows the area where the aculeus penetrated the skin.

Below are the observations made by the patient himself and two eyewitnesses. After arrival of the ambulance at 9:55 p.m., the medical team decided to monitor the patient and not immediately administer antivenom. However, one litre of sodium chloride was intravenously applied as an infusion and antihistamine was administered. Additionally, in order to reduce the pain, an initial mild painkiller was dispensed in the envenomation area. A full blood count, liver function, electrolyte blood levels and other routine laboratory tests were conducted and all showed normal values after 25 minutes of envenomation.

After approximately one hour, the acute pain (see Tab. 1 for the progress) radiated from the fingertip to the wrist. The area where the aculeus penetrated the skin started to redden. Up to this point, severe pain would sporadically set in and last for approximately four minutes at a time. The patient tried to stay as calm as possible and hold his thumb straight using his muscular strength to avoid additional pain caused by bending the finger or moving it quickly around. Additionally, every few minutes, seizures went down to the feet. After one hour,

Tab. 1: Severity and progression of envenomation caused by an adult *Leiurus abdullahbayrami* female scorpion sting. Time frame is stated in minutes after envenomation; pain scale from 1 to 10 indicates the subjective pain level described by the patient: 1 is mild pain and 10 is hardly bearable. Medical treatment documents the proceedings of the medical team over time

Time-frame	Area of pain	Pain level	Medical treatment
0	Fingertip	1	None
2-10	Fingertip, spreading out	2	None
25	Complete finger	3	Sodium chloride, antihistamine and mild painkiller
60	To the wrist	5	None
120	To the crook of the arm	8	None
180	To the shoulder	10	Narcotic painkiller
240	To the shoulder	9	None
300	Complete arm, decreasing	8	None
360	Complete arm	6	None
720	Arm-bed	5	Ibuprofen Atid 1600 mg

considering the more or less good condition of the patient, the medical team maintained their decision not to inject antivenom. Nevertheless, the pain was incredibly powerful. The patient held the railings of the bed tightly and his body was shaking because of the relapsing seizures. After two hours, the critical climax had been reached. The patient described this moment as the most painful minutes in his life. The skin of his arm began to contract and the first growth of pimples and small blisters became visible. Any contact of the skin initiated nearly unbearable pain and any active muscle movement in the thumb itself and the hand was impossible. After three hours, the medical team decided to administer new painkillers. They decided to evaluate the patient's condition every ten minutes to decide if antivenom would be used or not. After reaching this peak, the pain declined. At the end of the six hour observation and treatment period the patient was discharged with no further therapy or medication. The pain was still present, and vertical movement of the arm was not possible. During the following night, the patient was not able to sleep, any slow movement of the arm caused pain. In the morning of the next day (around 14 hours after the sting), a pharmacy was visited and some Ibuprofen Atid 800 mg was bought. After two tablets, the pain reached a bearable level, however numbness in the thumb remained and moving the arm caused pain. The stung area remained hypersensitive and touching the thumb resulted in paresthesia, which gradually resolved over two days. After ten days, another blood test was conducted and it showed more or less normal values.

Discussion

The genus *Leiurus* is one of the most dangerous in the world and is responsible for many scorpion envenomation cases in different countries in North Africa, the Middle East and the Arabian Peninsula. Therefore, the species *L. abdullahbayrami* is considered to be the most significant to humans in Turkey (Dittrich et al. 1995, Ozkan et al. 2011). This species is reported from Adıyaman, Gaziantep, Hatay, Kilis, Mardin and Şanlıurfa Provinces in south-eastern Turkey and also from northern Syria (Yağmur et al. 2009, Khalil & Yağmur 2010). In these regions, scorpionism is de facto a known medical problem and many scorpion stings have been reported in re-

cent history (for a review see Ozkan et al. 2007). Generally, the only specific treatment against scorpion poisoning is species-specific antivenom. It is often used, but its effectiveness is unclear and often disputed (Ozkan et al. 2011).

In Turkey the Refik Saydam Public Health Agency is the producer of the antivenom, compounded from the species *Androctonus crassicauda*. This antivenom has been used for all scorpion stings in Turkey (Adıguzel et al. 2007). Cesaretli & Ozkan (2010) presented a review of epidemiological and clinical aspects of scorpion stings in Turkey and revealed that most patients (more than 50%) were only treated symptomatically and only around one third of all cases were treated with antivenom. Therefore, the treatment at the Kilis hospital was a normal and proven protocol.

In conclusion, the initial sting caused mild pain and progressed to a hardly bearable one within three hours. The pain originated in the thumb of the right hand and progressed to the shoulder of the patient. Almost all systemic scorpion envenomation produce pain at the site of the sting and several other symptoms can follow. After the alpha and other toxins, the excess can cause adrenergic, cholinergic effects, sympathetic and parasympathetic effects respectively, and neuromuscular excitation (Isbister & Bawaskar 2014). In this case, only sympathetic effects occurred and only some of the classic effects were seen, i.e. irritability, agitation and seizures. The patient suffered pain, but no cardiovascular effects, arrhythmias, hypotension, multi-organ failure or respiratory failure (Yağmur et al. 2015).

Since the sting was by the most venomous species known to science, the patient was very lucky that a stone, and not his thumb, was the first encounter with the culprit. Some plausible explanations might be that (i) the specimen previously lost some of its venom during the first encounter with a stone, (ii) the scorpion had recently used its venom stinging some other animals and was therefore exhausted, (ii) the species' venom is more toxic to mice than humans, or (iii) some combination of these. Another possible explanation for this is that the toxic sting contained only a so-called prevenom, highly painful and toxic but with a different mixture of ingredients than a normal sting (Inceoglu et al. 2003). This study did not scrutinize to what extent the venom of *L. abdullahbayrami* is deadly or not and, therefore, does not portray the real potential power of the venom. However, it constitutes an important starting point and stimulus for exciting future reports. Further research should quantify the true effects and the whole clinical spectrum of the scorpion sting.

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Spiders and harvestmen on tree trunks obtained by three sampling methods

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Abstract. We studied spiders and harvestmen on tree trunks using three sampling methods. In 2013, spider and harvestman research was conducted on the trunks of selected species of deciduous trees (linden, oak, maple) in the town of Přerov and a surrounding floodplain forest near the Bečva River in the Czech Republic. Three methods were used to collect arachnids (pitfall traps with a conservation fluid, sticky traps and cardboard pocket traps). Overall, 1862 spiders and 864 harvestmen were trapped, represented by 56 spider species belonging to 15 families and seven harvestman species belonging to one family. The most effective method for collecting spider specimens was a modified pitfall trap method, and in autumn (September to October) a cardboard band method. The results suggest a high number of spiders overwintering on the tree bark. The highest species diversity of spiders was found in pitfall traps, evaluated as the most effective method for collecting harvestmen too.

Keywords: Araneae, arboreal, bark traps, Czech Republic, modified pitfall traps, Opiliones

Trees provide important microhabitats for arachnids including specific microclimatic and structural conditions in the bark cracks and hollows (Wunderlich 1982, Nikolai 1986). Some species lives on tree trunks throughout the year, whereas other spiders use trees only for a certain period, mainly during overwintering (Horváth et al. 2001, 2004). Facultative bark-dwelling spiders which usually live in the canopies are found on trees only in late autumn to early spring, i.e. in season when deciduous trees are without leaves (Horváth & Szinetár 2002).

Bark-dwelling spiders are relatively rarely studied. Information on bark-dwelling spiders are scattered in studies focused on the diversity of fauna of particular forest habitats (e.g. Weiss 1995, Horváth & Szinetár 2002, Blick 2011) or parks and towns (e.g. Hansen 1992, Horváth & Szinetár 1998). Applied research may study bark-dwelling spiders as pest-control agents in orchards (e.g., Bogya et al.1999, Pekár 1999). Some studies are focused specifically on spider biology, e.g. overwintering (Pekár 1999, Spitzer et al. 2010) or habitat stratification (e. g. Simon 1994). Several species find shelter on tree trunks during harsh conditions, e.g. floods (Zulka 1989, Marx et al. 2012). In Europe, several hundreds of spider species were reported on the bark of different tree species (Szinetár & Horváth 2006, Blick 2011).

Different methods can be used to collect arachnids living on tree trunks. The most popular ones are arboreal eclectors placed on trunks (e.g. Albrecht 1995, Kubcová & Schlaghamerský 2002, Blick 2011) or branches in canopies (e.g. Koponen 2004, Moeed & Meads 1983, Simon 1995). Another method is the bark trap which can be made from wrapped cardboard (e.g. Bogya et al. 1999, Horváth & Szinetár 1998, 2002, Horváth et al. 2001, 2004, 2005) or polyethylene bubble film (Isaia et al. 2006). Pitfall traps (i.e. Barber traps) were adopted to sample trunk inhabiting invertebrates too (e.g. Pinzon & Spence 2008). Canopy-inhabiting invertebrates can be sampled by fogging (e.g. Otto & Floren 2007), window traps, various types of eclectors or direct beating of branches (Bolzern & Hänggi 2005, Blick & Gossner 2006, Aguilar 2010), but these methods are expensive, time-consuming or difficult.

This study is focused on the comparison of the species spectrum of spiders and harvestmen obtained by three simple low-cost trap designs – modified pitfall traps, cardboard bands and sticky traps.

Material and methods

The study was carried out in Přerov Town (49°26'58"N, 17°27'23"E) and a surrounding floodplain forest fragment (49°28'8"N, 17°29'7"E) in the Czech Republic. Both localities are situated at 220 m a.s.l. Spiders and harvestmen were sampled on the trunks of three different species of deciduous trees (Littleleaf linden – *Tilia cordata*, Norway maple – *Acer platanoides*, English oak – *Quercus robur*) using three different methods. Simple pitfall traps were made from the 1.5-litre plastic bottles (Fig. 1) filled with 0.25 litre of a saturated solution of salt (NaCl). Sticky traps were made from ordinary transparent sticky tape 20 cm wide and 40 cm long covered with a layer of glue 95-10-0220 used against tree pests (tape Stromset made by Propher, Fig. 2). Cardboard bands were made from corrugated cardboard 20 cm wide and 40 cm long (Fig. 3). Altogether, 90 traps were installed on 90 trees (each tree with one trap, 15 traps for each method in the forest as well as in the town, i.e. 45 trees in the forest and 45 trees in the town). The tree species were equally sampled by different traps in the forest and in the town (15 lindens, 15 maples and 15 oaks in both forest and town). Traps were placed on the tree trunks at a height of 4 m. Traps were exposed from May 5th to October 27th 2013 and sampled monthly. Spiders and harvestmen were identified to species level using common identification keys (Miller 1971, Šilhavý 1971, Nentwig et al. 2015). Nomenclature followes the World Spider Catalog (2015) and Martens (2013).

Results

Overall, 1862 spiders and 864 harvestmen were trapped, representing 56 spider species from 15 families and seven harvestman species from one family (Tab. 1). One third of all spiders were immature specimens (*Clubiona* 57 %, *Theridion* 23 %, *Philodromus* 20 %). Juveniles of Linyphiidae, which could not be determined to genus level, were not counted. Although the number of recorded individuals was higher in the forest than in town, the number of species was similar between the localities (39 vs. 39 species of spiders and seven vs. five harvestman species respectively). The highest number of species and specimens of spiders and harvestmen were found on oak. A total of 1133 spiders belonging to 48 species and

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Fig. 1: Pitfall trap made from a plastic bottle
Fig. 2: Sticky trap
Fig. 3: Cardboard band trap

805 harvestmen belonging to seven species were captured in modified pitfall traps. In total 16 spider species were recorded by pitfall trapping exclusively (30 % of all species sampled by this method). The most abundant taxa obtained using this method were *Anyphaena accentuata*, *Clubiona pallidula* (*Clubiona* sp.), *Drapetisca socialis* and the harvestman *Rilaena triangularis*. A total of 560 spiders belonging to 31 species but only 27 (mainly immature) harvestmen were sampled by cardboard bands (Tab. 1). Four spider species were obtained by this method exclusively (13 % of all species recorded by this method). The most abundant taxa obtained using this method were *Clubiona pallidula* and *Nuctenea umbratica*. A total of 169 spiders belonging to 24 species and 32 harvestmen belonging to three species were stuck on sticky traps. Three spider species were sampled by sticky traps exclusively (11 % of all species captured by this method). The most abundant taxa obtained with this method were *Philodromus* sp. and *Drapetisca socialis*. The number of spider and harvestman specimens trapped in pitfall traps was the highest in May at both localities (Fig. 4), whereas the number of species was the highest in July (Fig. 5). The effectivity of cardboard bands (both in the number of individuals and species) was highest in October (Figs 4, 5). Only 11 species of spiders were trapped by all methods, other species were recorded by one method exclusively, or by a combination of two methods (Tab. 1).

Discussion

The 56 spider species collected during this study mostly represent common arboreal species. The number of spider species is low in comparison with some other methods like eclectors (e.g. Albert 1976, Platen 1985, Simon 1995, Koponen 1996, Blick 2009, 2012). Evidently, trunk eclectors are much more effective in sampling the whole spider species spectrum compared to our methods. Using trunk eclectors in different forests in Germany Blick (2011) found a total of 334 spider species between 1990 and 2003. In a different project (Blick

Tab. 1: List of all collected spiders and harvestmen species and the number of specimens collected at two localities and by three different methods. L – linden, O – oak, M – maple; PT – pitfall traps, CB – cardboard bands, ST – sticky traps. Bold numbers indicate trapping exclusively with one method.

Species/Family	Locality		Tree			Method		
	Forest	Town	L	O	M	PT	CB	ST
Araneae								
Segestriidae								
Segestria senoculata (Linnaeus, 1758)	1	3	.	3	1	3	1	.
Mimetidae								
Ero furcata (Villers, 1789)	1	.	.	1	.	**1**	.	.
Theridiidae								
Anelosimus vittatus (C. L. Koch, 1836)	2	12	9	.	5	13	1	.
Dipoena melanogaster (C. L. Koch, 1837)	4	4	.	8	.	4	3	1
Enoplognatha ovata (Clerck, 1757)	12	2	3	9	2	10	.	4
Parasteatoda lunata (Clerck, 1757)	8	7	6	3	6	12	3	.
Parasteatoda simulans (Thorell, 1875)	.	1	1	.	.	.	.	**1**
Platnickina tincta (Walckenaer, 1802)	24	23	10	31	6	10	24	13
Steatoda bipunctata (Linnaeus, 1758)	.	2	.	2	.	.	**2**	.
Theridion mystaceum L. Koch, 1870	22	14	9	21	6	.	29	7
Theridion varians Hahn, 1833	4	10	6	7	1	9	1	4
Theridion sp. (juv.)	61	42	40	46	17	50	17	36
Linyphiidae								
Agyneta innotabilis (O. P.-Cambridge, 1863)	.	11	.	7	4	9	.	2
Agyneta rurestris (C. L. Koch, 1836)	7	2	5	4	.	7	1	1
Bathyphantes sp. (juv.)	1	.	.	1	.	**1**	.	.
Drapetisca socialis (Sundevall, 1833)	95	24	69	21	29	99	4	16
Entelecara acuminata (Wider, 1834)	13	12	7	2	16	22	.	3
Erigone atra Blackwall, 1833	.	1	1	.	.	.	.	**1**
Hypomma cornutum (Blackwall, 1833)	12	.	.	12	.	7	5	.
Lepthyphantes minutus (Blackwall, 1833)	80	15	17	39	39	53	42	.
Moebelia penicillata (Westring, 1851)	24	20	20	12	12	10	34	.
Neriene montana (Clerck, 1757)	13	.	.	13	.	2	11	.

Species/Family	Locality		Tree			Method		
	Forest	Town	L	O	M	PT	CB	ST
Tenuiphantes flavipes (Blackwall, 1854)	2	2	.	2	2	3	.	1
Trematocephalus cristatus (Wider, 1834)	8	6	4	2	8	11	1	2
Tetragnathidae								
Pachygnatha listeri Sundevall, 1830	1	.	.	1	.	**1**	.	.
Tetragnatha pinicola L. Koch, 1870	4	2	1	5	.	2	.	4
Araneidae								
Araneus sp. (juv.)	.	8	.	.	8	6	.	2
Gibbaranea gibbosa (Walckenaer, 1802)	.	3	3	.	.	**3**	.	.
Larinioides sclopetarius (Clerck, 1757)	.	4	4	.	.	**4**	.	.
Nuctenea umbratica (Clerck, 1757)	24	45	8	30	31	20	49	
Zygiella atrica (C. L. Koch, 1845)	.	1	.	.	1	**1**	.	.
Agelenidae								
Agelena labyrinthica (Clerck, 1757)	.	1	.	.	1	.	**1**	.
Eratigena atrica (C. L. Koch, 1843)		1	1	.	.	**1**	.	.
Tegenaria silvestris (L. Koch, 1872)	5	.	.	3	2	4	.	1
Dictynidae								
Brigittea civica (Lucas, 1850)	.	2	2	.	.	1	.	1
Dictyna uncinata Thorell, 1856	1	.	1	.	.	.	.	1
Emblyna annulipes (Blackwall, 1846)	.	2	.	.	2	.	**2**	.
Lathys humilis (Blackwall, 1855)	4	.	.	3	1	3	1	.
Nigma flavescens (Walckenaer, 1830)	2	.	.	2	.	1	.	1
Nigma walckenaeri (Roewer, 1951)	.	10	.	.	10	2	8	.
Eutichuridae								
Cheiracanthium mildei L. Koch, 1864	.	10	1	.	9	5	5	.
Anyphaenidae								
Anyphaena accentuata (Walckenaer, 1802)	241	114	78	214	73	316	33	6
Clubionidae								
Clubiona brevipes Blackwall, 1841	8	.	.	8	.	**8**	.	.
Clubiona comta C. L. Koch, 1839	3	.	1	2	.	2	1	.
Clubiona lutescens Westring, 1851	.	3	2	.	1	2	1	.
Clubiona pallidula (Clerck, 1757)	175	124	62	184	53	105	191	3
Clubiona sp. (juv.)	202	54	68	114	74	175	51	30
Gnaphosidae								
Micaria subopaca Westring, 1861	3	.	.	3	.	2	1	.
Philodromidae								
Philodromus albidus Kulczyński, 1911	1	13	10	.	4	10	1	3
Philodromus sp. (juv.)	23	47	17	31	22	53	.	17
Thomisidae								
Ozyptila praticola (C. L. Koch, 1837)	36	4	.	40	.	11	29	.
Pistius truncatus (Pallas, 1772)	5	.	1	4	.	.	5	.
Synema globosum (Fabricius, 1775)	1	.	.	1	.	**1**	.	.
Xysticus lanio C. L. Koch, 1835	18	.	2	12	4	**18**	.	.
Salticidae								
Ballus chalybeius (Walckenaer, 1802)	8	5	3	10	.	**13**	.	.
Evarcha falcata (Clerck, 1757)	1	.	.	1	.	**1**	.	.
Salticus scenicus (Clerck, 1757)	.	8	5	.	3	**8**	.	.
Salticus zebraneus (C. L. Koch, 1837)	9	19	7	17	4	18	4	6
Opiliones								
Phalangiidae								
Lacinius dentiger (C. L. Koch, 1847)	3	1	.	2	2	**4**	.	.
Lacinius ephippiatus (C. L. Koch, 1935)	17	6	.	11	12	**23**	.	.
Mitopus morio (Fabricius, 1799)	1	.	.	.	1	**1**	.	.
Opilio canestrinii (Thorell, 1876)	7	20	5	12	10	26	1	.
Opilio saxatilis C. L. Koch, 1839	3	.	3	.	.	1	.	2
Phalangiidae spp. (juv.)	26	.	.	26	.	.	**26**	.
Phalangium opilio Linnaeus, 1761	12	1	4	7	2	9	.	3
Rilaena triangularis (Herbst, 1799)	566	202	203	471	94	741	.	27

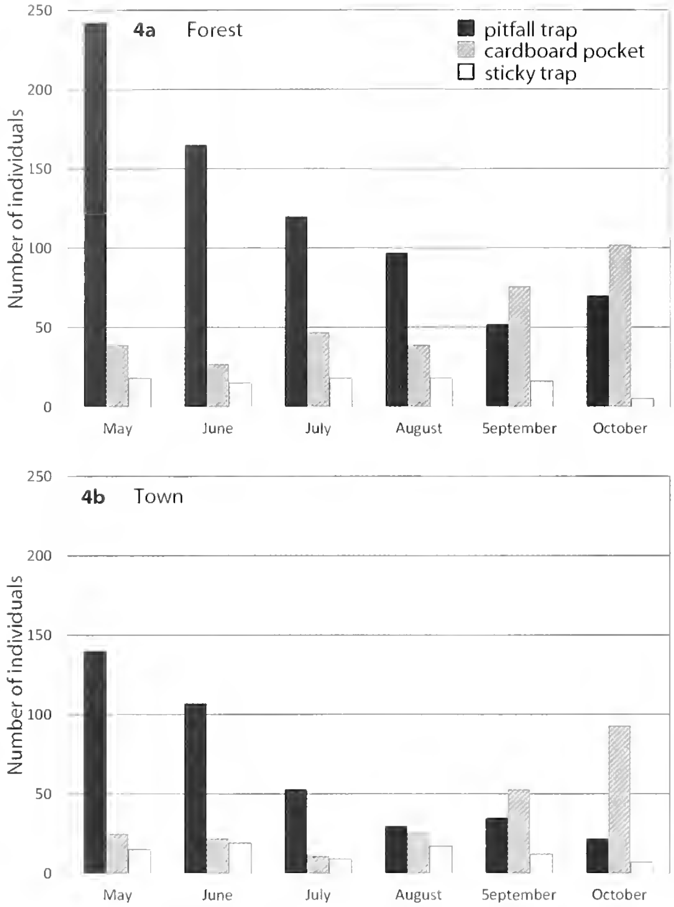

Fig. 4: Number of spider specimens obtained by three sampling methods during one year (total number); above (**4a**) – forest, below (**4b**) – town

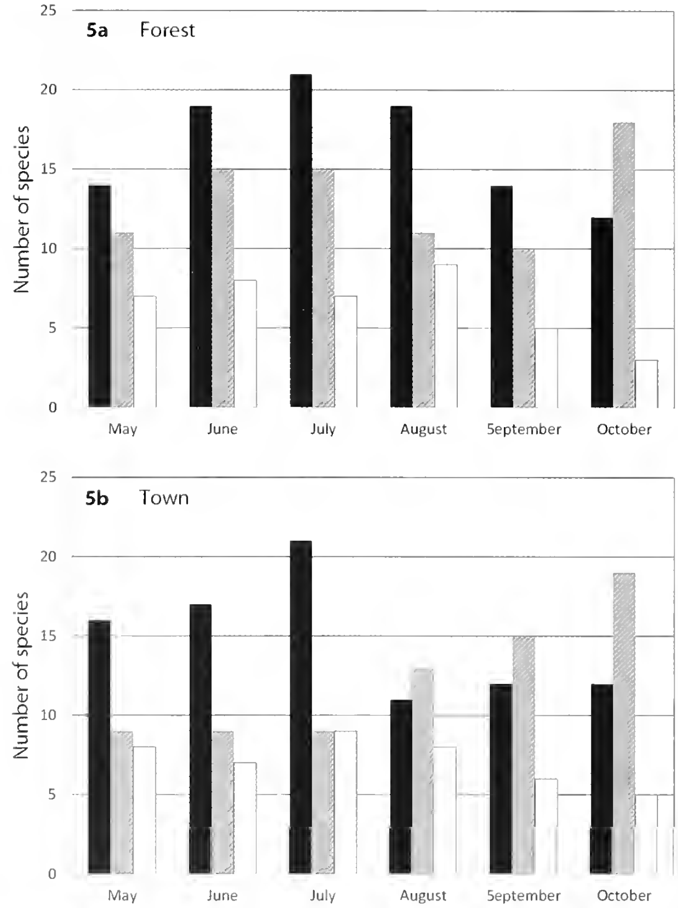

Fig 5: Number of spider species obtained from three sampling methods during one year (total number); above (**5a**) – forest, below (**5b**) – town

2010), 105-151 spider species was sampled using just 8 eclectors in different forest reserves in Hesse (Germany). Similarly, Platen (1985) sampled 69 species using just one eclector.

Nevertheless, in comparison with other studies using modified pitfall traps, its efficiency was similar: Weiss (1995) found 57 species and Machač (2014) found 33 spider species and 3 harvestman species from 18 traps contrary to 48 species recorded by pitfall traps in this study. We trapped relatively more harvestman species than has been published (Sührig & Rothländer 2006), but without some typical bark-dwelling species, e.g. from the genus *Leiobunum*. The number of species can also be influenced by the type of locality, both localities are relatively disturbed and without protected nature status.

Most of the collected spider species in the forest are widespread, silvicolous spiders with a known arboreal occurrence (Szinetár & Horváth 2006). In the town, synanthropic species of spiders were collected too, e.g. *Brigittea civica*, *Cheiracanthium mildei* and *Nigma walckenaeri* (Buchar & Růžička 2002). The most dominant species found in the town and the forest are the common spider species *Anyphaena accentuata*, *Clubiona pallidula* and the harvestman *Rilaena triangularis*, known from previous studies (e.g. Horváth et al. 2001, Horváth & Szinetár 2002). The greatest number of spider specimens collected using cardboard bands were obtained during September and October (almost 60% of them). The exclusive species recorded in cardboard bands were *Agelena labyrinthica*, *Emblyna annulipes*, *Pistius truncatus* and *Steatoda bipunctata*. Tree trunks provide important shelters for the overwintering of spiders (Pekár 1999, Horváth & Szinetár 2002, Szinetár & Horváth 2006). Corrugated cardboard bands simulate tree bark asperities and spiders used them preferably (Isaia et al. 2006). During summer months, these cardboard bands are inhabited mostly by females with egg sacs, e.g. *Clubiona pallidula*, *Nuctenea umbratica* or *Ozyptila praticola*, which provide calm and warm shelters. Similarly, the spider *Oreonetides quadridentatus* is known to migrate onto tree trunks from soil during spring (Kopecký & Tuf 2013). Cardboard bands seem to be effective for sampling species living under bark or overwintering on trunks. On the contrary, this method is not suitable for harvestmen as only one aggregation of unidentified juveniles was found.

The pitfall traps made from PET bottles obtained the most spider specimens and the largest number of spider species (48) as well as harvestmen species (seven). Also, the highest portion of exclusive species was recorded by this method, including a majority of specimens belonging to Araneidae and Salticidae as well as harvestmen. The highest number of spider and harvestman specimens was obtained by this method during May, including the harvestman *Rilaena triangularis* which is most active in this month (Klimeš 1990). Pinzon & Spence (2008) found only 33 species on trunks using trunk pitfall traps in the forests of Canada. Trunk pitfall traps are, however, very effective for sampling of spiders and harvestmen living on tree trunks (Weiss 1995).

The sticky trap method was not effective for arachnids at all. Twenty-four spider (mostly juveniles and small species) and three harvestman species were obtained using this method only. Moreover, harvestmen were usually damaged when

releasing them from the glue. This method is not usually used for sampling arachnids, but is suitable for monitoring ballooning spiders (e.g. Greenstone et al. 1985). Sticky traps are more suitable for flying insects, e.g. Coleoptera, Diptera or Hymenoptera (Horváth et al. 2005, Bar-Ness et al. 2012).

Based on our results, we can recommend pitfall trapping for sampling spiders and harvestmen from tree trunks. In autumn and during winter, this method can be combined (or replaced) with cardboard bands (bark traps) as an effective method to collect arachnids searching for overwintering shelters.

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Zur Springspinnenfauna (Araneae, Salticidae) der griechischen Dodekanes-Insel Kos, mit zwölf Erstnachweisen

Michael Schäfer

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Abstract. On the jumping spider fauna (Araneae, Salticidae) of the Greek Dodecanese island of Kos, with 12 first records. Twelve species of jumping spiders were recorded for the first time for the Greek Dodecanese island of Kos. Five of these species (*Euophrys rufibarbis, Heliophanus equester, Menemerus taeniatus, Phlegra lineata* and *Pseudicius badius*) are considered first records for the entire Dodecanese.

Keywords: distribution, Europe, new faunistic record, spider

Zusammenfassung. Für die griechische Dodekanes-Insel Kos konnten 12 Springspinnenarten erstmals nachgewiesen werden. Darunter sind fünf Arten (*Euophrys rufibarbis, Heliophanus equester, Menemerus taeniatus, Phlegra lineata* und *Pseudicius badius*) neu für den gesamten Bereich des Dodekanes.

Als Teil der südlichen Sporaden und des Dodekanes liegt die griechische Insel Kos in der östlichen Ägäis, nur 5 km vor der türkischen Küste. Die geografische Nähe zu Vorderasien beeinflusst den gesamten Bereich des Dodekanes, was sich an der sehr artenreichen Flora und Fauna deutlich zeigt, die neben mediterranen Elementen auch etliche Arten enthält, die ihren Verbreitungsschwerpunkt im vorderasiatischen Raum haben (Metzner 1999). Für die Springspinnenfauna sind hier stellvertretend *Heliophanus mordax*, *Mogrus canescens* oder *Plexippoides gestroi* zu nennen.

Während eines Aufenthaltes auf der griechischen Insel Kos in der Zeit vom 17.06. bis 28.06.2014 wurden 20 Springspinnenarten aus 16 Gattungen nachgewiesen. Die insgesamt 59 Einzelindividuen wurden an 18 Lokalitäten (Tab. 1) gesammelt, die sich hauptsächlich an der Südküste der Insel, rund um den Ort Kardamena, befinden. Zwölf Arten konnten dabei erstmals für die Insel Kos nachgewiesen werden. Die Arten sind *Chalcoscirtus infimus* (Simon, 1868), *Euophrys rufibarbis* (Simon, 1868), *Heliophanus equester* L. Koch, 1867, *Menemerus taeniatus* (L. Koch, 1867), *Pellenes arciger* (Walckenaer, 1837), *Pellenes diagonalis* (Simon, 1868), *Phlegra lineata* (C. L. Koch, 1846), *Plexippoides gestroi* (Dalmas, 1920), *Plexippus paykulli* (Audouin, 1826), *Pseudicius badius* (Simon, 1868), *Sitticus distinguendus* (Simon, 1868) und *Thyene imperialis* (Rossi, 1846).

Material und Methoden

Das Material wurde vom Autor gesammelt und bestimmt. Einige der Tiere wurden als Jungtiere aufgesammelt und später zur Reifehäutung gebracht. In diesen Fällen wird das Datum der Reifehäutung separat ausgewiesen. Weiterhin wurden aus den Gelegen von *Habrocestum egaeum* Metzner, 1999, *Heliophanus equester* L. Koch, 1867 und *Phlegra lineata* (C. L. Koch, 1846) mehrere Jungtiere zur Reife gebracht, welche, als solche gekennzeichnet, ebenfalls als Material in die Artenliste einfließen.

Alle Tiere wurden als Belege in 70 % Ethanol konserviert und in der Sammlung des Autors archiviert. Alle Fotos sind mit einer Canon EOS 50D Spiegelreflex-Kamera gemacht worden. Dabei wurde für die Lebendfotos ein Canon MP-E 65mm Lupenobjektiv verwendet. Für die Aufnahmen der Genitalpräparate kam die Kamera direkt montiert am Fototubus eines Motic SMZ-168 TP Stereomikroskops zum Einsatz.

Aelurillus blandus (Simon, 1871)

GRIECHENLAND: L1, Strand, 19.06.2014: 1♂, 3♀♀, 2 juv – Reifehäutung 19.07.2014: 1♂, 18.08.2014: 1♀; L1, Strand, 20.06.2014: 1♂; L2, Düne, 23.06.2014: 1♀. Bestimmung: Azarkina (2002). Verbreitung: Griechenland, Kreta (World Spider Catalog 2015).

Chalcoscirtus infimus (Simon, 1868)

GRIECHENLAND: L3, Gehweg, 22.06.2014: 1♀. Bestimmung: Metzner (1999). Verbreitung: Süd- und Mitteleuropa bis Zentralasien (World Spider Catalog 2015). Neu für Kos.

Cyrba algerina (Lucas, 1846)

GRIECHENLAND: L4, im Haus, 22.06.2014: 1♀. Bestimmung: Metzner (1999). Verbreitung: Kanarische Inseln bis Zentralasien (World Spider Catalog 2015).

Euophrys rufibarbis (Simon, 1868)

GRIECHENLAND: L5, unter Stein, 19.06.2014: 1juv – Reifehäutung 01.10.2014: 1♂; L5, unter Stein, 20.06.2014: 1juv – Reifehäutung 16.10.2014: 1♂; L5, unter Stein, 22.06.2014: 1juv – Reifehäutung 17.10.2014: 1♂; L6, unter Stein, 23.06.2014: 4 juv – Reifehäutung 20.10.2014: 1♂, 11.11.2014: 1♀, 14.11.2014: 1♀, 08.12.2014: 1♀; L7, unter Stein, 24.06.2014: 1 juv – Reifehäutung 10.10.2014: 1♂. Bestimmung: Metzner (1999). Verbreitung: Paläarktis (World Spider Catalog 2015). Neu für den Dodekanes.

Habrocestum egaeum Metzner, 1999

GRIECHENLAND: L7, Steinhaufen, 24.06.2014: 2♂♂, 2♀♀, 22.07.2014: 1 Eikokon (in Gefangenschaft) - Reifehäutung 20.05.2015: 1♂, 03.06.2015: 1♀, 27.07.2015: 1♀, 02.08.2015: 1♀; L8, unter Stein, 26.06.2014: 1 juv – Reifehäutung 14.11.2015: 1♀. Bestimmung: Metzner (1999). Verbreitung: Griechenland, Kreta, Türkei (World Spider Catalog 2015).

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Tab. 1: Fundorte der gesammelten Tiere
Tab. 1: Localities of the collected specimens

Abk.	Fundort	Breite	Länge	Höhe ü. NN	Habitat	Funde
L1	Kardamena	36.80050°N	27.16157°E	5 m	Strand	8
L2	Tam Tam Strand	36.85770°N	27.10618°E	3 m	Strand, Düne	2
L3	Kardamena	36.80922°N	27.17056°E	6 m	Hotelanlage	2 (+5)
L4	Kardamena	36.80924°N	27.17030°E	6 m	Hotelanlage	2
L5	Kardamena	36.80851°N	27.17025°E	4 m	Ruderalfläche	7 (+6)
L6	Agios Ioannis	36.70198°N	26.94758°E	214 m	vegetationsloser Lehmhang	4
L7	Kastell Antimachia	36.80318°N	27.12838°E	139 m	Phrygana	11 (+4)
L8	Kardamena	36.81782°N	27.17755°E	107 m	trockenes Bachbett	2
L9	Kardamena	36.81468°N	27.17462°E	27 m	Phrygana	3
L10	Kardamena	36.80957°N	27.17229°E	5 m	Hotelanlage	1
L11	Kardamena	36.80917°N	27.17025°E	6 m	Hotelanlage	2
L12	Kardamena	36.81710°N	27.17685°E	81 m	Ruderalfläche	2
L13	Kardamena	36.81373°N	27.17327°E	16 m	Phrygana	1
L14	Kardamena	36.81645°N	27.17317°E	37 m	Phrygana/Trockenmauer	3
L15	Kos Stadt	36.89363°N	27.29130°E	5 m	Ausgrabungungsstätte	2
L16	Kardamena	36.81004°N	27.16955°E	7 m	Hotelanlage	2
L17	Salinen bei Tigkaki	36.88835°N	27.17728°E	0 m	Lagunenrand	4
L18	Kardamena	36.80917°N	27.17085°E	6 m	Hotelanlage	1

***Heliophanus equester* L. Koch, 1867**
GRIECHENLAND: L3, Gehweg, 21.06.2014: 1♀, 16.07.2014: 1 Eikokon (in Gefangenschaft) - Reifehäutung 06.04.2015: 1♂, 18.04.2015: 1♂, 22.04.2015: 1♂, 30.04.2015: 1♂, 10.05.2015: 1♀; L9, Krautschicht, 21.06.2014: 1♀. Bestimmung: Wesołowska (1986). Verbreitung: Italien bis Aserbaidschan (World Spider Catalog 2015). Neu für den Dodekanes.

***Heliophanus kochii* Simon, 1868** (Abb. 1 a, b, g, h)
GRIECHENLAND: L9, Krautschicht, 21.06.2014: 1 juv – Reifehäutung 08.11.2014: 1♂; L7, unter Stein, 24.06.2014: 2 juv – Reifehäutung 10.12.2014: 1♀, 23.02.2015: 1♀. Bestimmung: Wesołowska (1986). Verbreitung: Paläarktis (World Spider Catalog 2015).

Obwohl alle gesammelten Tiere genital eindeutig *Heliophanus kochii* zuzuordnen sind, bleibt ein kleiner Rest Unsicherheit bei der Bestimmung, da sich speziell die Männchen (Abb. 1 a, b) in ihrer Farbgebung und Zeichnung vollkommen von denen der Normalform (Abb. 1 c-f) unterscheiden. Statt der üblichen braunen Färbung mit den 4 weißen Haarflecken und dem weißen Band am oberen Ende, ist deren Opisthosoma völlig schwarz gefärbt und weist einen purpur-grünlichen Glanz auf. Außerdem fehlt die typische weiße Behaarung des männlichen Palpus. Die weiblichen Tiere (Abb. 1 g, h) weisen habituell keine so signifikanten Unterschiede zur Normalform (Abb. 1 i, j) auf. Hier ist lediglich das Fehlen von 2 der sonst meist 4 vorhandenen weißen Haarflecken auffällig.

Sowohl Metzner (1997) als auch Wesołowska (1986) weisen in ihren Arbeiten auf Tiere mit fehlender oder abweichender Zeichnung hin, die *H. kochii* zuzuordnen sind.

Jedoch kann man laut Wanda Wesołowska (in litt.) nicht gänzlich ausschließen, dass es sich bei diesem Fund, aufgrund der doch sehr markanten Unterschiede im Habitus des Männchens, um eine neue, sehr eng mit *H. kochii* verwandte Art handeln könnte. Unter Umständen würde ein genbasierter Vergleich von Material mehr Klarheit schaffen.

***Menemerus semilimbatus* (Hahn, 1829)** (Abb. 2 a, c)
GRIECHENLAND: L10, Mauer, 21.06.2014: 1♂; L11, Mauer, 25.06.2014: 1♀. Bestimmung: Metzner (1999). Verbreitung: Kanarische Inseln bis Aserbaidschan, Iran; eingeschleppt in Chile, Argentinien und den USA (World Spider Catalog 2015).

Die gesammelten Tiere (Abb. 2 a, c) sind genital eindeutig *Menemerus semilimbatus* zuzuordnen. Habituell zeigen allerdings beide Tiere deutliche Abweichungen von den von mir bisher im Mittelmeerraum gesammelten Individuen der Art. Die gesamte Behaarung der Tiere ist viel dichter und lässt das Opisthosoma fast weiß erscheinen, wodurch die sonst so typische Musterung der Art (Abb. 2 b, d) quasi unsichtbar wird.

***Menemerus taeniatus* (L. Koch, 1867)**
GRIECHENLAND: L12, an Rinde, 26.06.2014: 1♂. Bestimmung: Metzner (1999). Verbreitung: mediterran bis Kasachstan; Argentinien (World Spider Catalog 2015). Neu für den Dodekanes.

***Mogrus neglectus* (Simon, 1868)**
GRIECHENLAND: L7, Krautschicht, 23.06.2014: 1♀; L7, Krautschicht, 24.06.2014: 3♀♀; L13, Krautschicht, 26.06.2014: 1 juv – Reifehäutung 10.05.2015: 1♀. Bestimmung: Metzner (1999). Verbreitung: Griechenland, Mazedonien, Türkei, Zypern, Israel, Iran, Aserbaidschan, Kasachstan (World Spider Catalog 2015).

***Pellenes arciger* (Walckenaer, 1837)**
GRIECHENLAND: L9, Krautschicht, 21.06.2014: 1♀. Bestimmung: Metzner (1999). Verbreitung: Südeuropa (World Spider Catalog 2015). Neu für Kos.

***Pellenes diagonalis* (Simon, 1868)**
GRIECHENLAND: L14, auf Stein, 21.06.2014: 1♀. Bestimmung: Metzner (1999). Verbreitung: Korfu, Griechen-

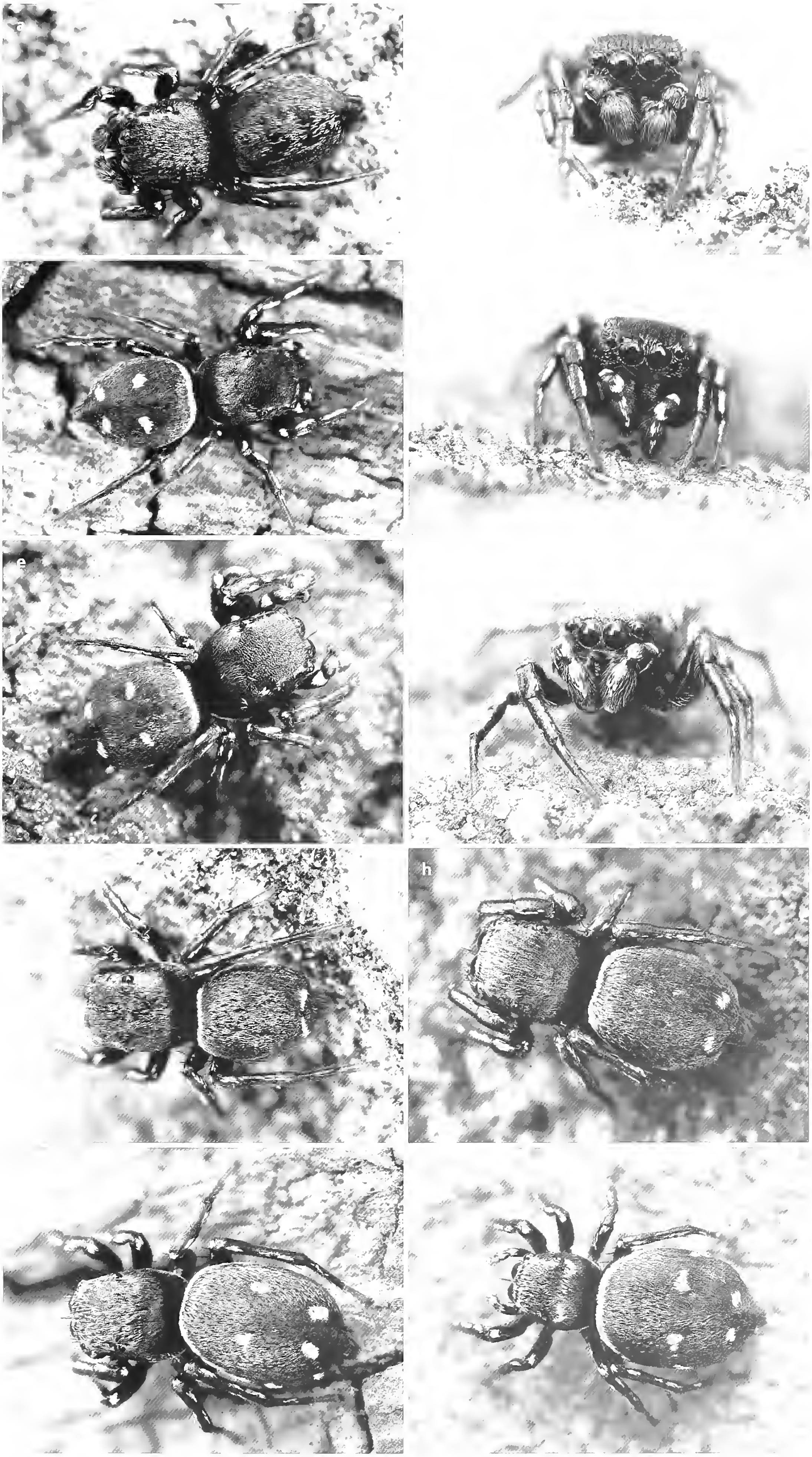

Abb. 1/Fig 1:
Heliophanus kochii,

a. Männchen von Kos, Dorsalansicht;
b. Männchen von Kos, Frontalansicht;

a. male from Kos, habitus dorsal;
b. male from Kos, habitus frontal;

c. Männchen aus Deutschland, Dorsalansicht;
d. Männchen aus Deutschland, Frontalansicht;

c. male from Germany, habitus dorsal;
d. male from Germany, habitus frontal

e. Männchen aus Portugal, Dorsalansicht;
f. Männchen aus Portugal, Frontalansicht;

e. male from Portugal, habitus dorsal;
f. male from Portugal, habitus frontal;

g. Weibchen 1 von Kos, Dorsalansicht;
h. Weibchen 2 von Kos, Dorsalansicht;

g. female 1 from Kos, habitus dorsal;
h. female 2 from Kos, habitus dorsal;

i. Weibchen aus Deutschland, Dorsalansicht;
j. Weibchen aus Portugal, Dorsalansicht

i. female from Germany, habitus dorsal;
j. female from Portugal, habitus dorsal

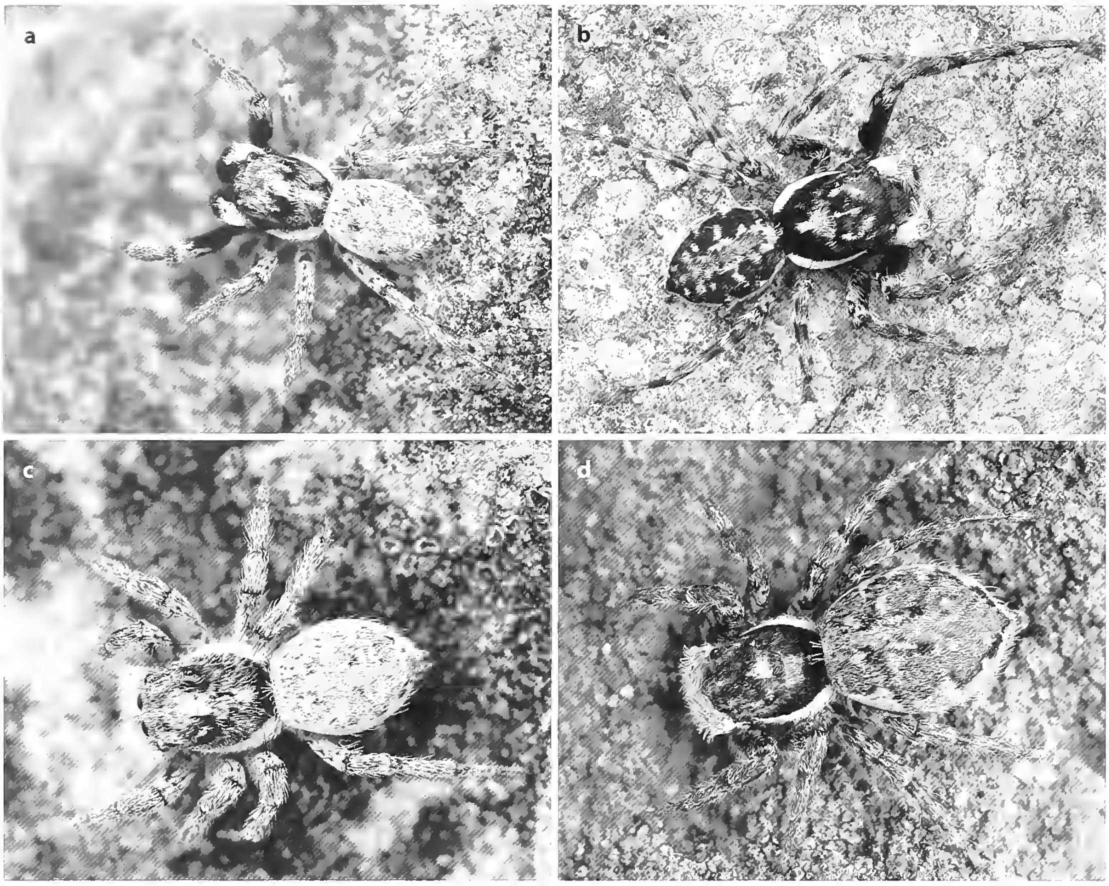

Abb. 2/Fig. 2: *Menemerus semilimbatus,*

a. Männchen von Kos, Dorsalansicht;
b. Männchen aus Portugal, Dorsalansicht;

a. male from Kos, habitus dorsal;
b. male from Portugal, habitus dorsal;

c. Weibchen von Kos, Dorsalansicht;
d. Weibchen aus Portugal, Dorsalansicht

c. female from Kos, habitus dorsal;
d. female from Portugal, habitus dorsal

land, Mazedonien, Türkei, Israel (World Spider Catalog 2015). Neu für Kos.

Philaeus chrysops **(Poda, 1761)**
GRIECHENLAND: L15, auf Weg, auf Steinplatte, 24.06.2014: 1♂, 1♀. Bestimmung: Metzner (1999). Verbreitung: Paläarktis (World Spider Catalog 2015).

Phlegra fasciata **(Hahn, 1826)**
GRIECHENLAND: L5, unter Stein, 19.06.2014: 1♀; L5, unter Stein, 22.06.2014: 1♀, 1 juv – Reifehäutung 05.07.2014: 1♀; L2, Düne, 23.06.2014: 1 juv – Reifehäutung 20.11.2014: 1♂; L16, Mauer, 25.06.2014: 1♀; L17, Schlickboden, 25.06.2014: 1 juv – Reifehäutung 20.03.2015: 1♀. Bestimmung: Metzner (1999). Verbreitung: Paläarktis (World Spider Catalog 2015).

Phlegra lineata **(C.L. Koch, 1846)** (Abb. 3 a, b, e, f)
GRIECHENLAND: L5, unter Stein, 19.06.2014: 1♀, 23.06.2014: 1 Eikokon (in Gefangenschaft) - Reifehäutung 26.05.2015: 1♀, 03.06.2015: 1♀, 15.06.2015: 1♀, 05.07.2015: 1♀, 14.07.2015: 1♀, 16.07.2015: 1♀; L1, Strand, 20.06.2014: 1juv – Reifehäutung 01.10.2014: 1♂. Bestimmung: Metzner (1999). Verbreitung: Südeuropa, Türkei, Syrien (World Spider Catalog 2015). Neu für den Dodekanes.

Mit Hilfe von Metzner (1999) konnte keines der Tiere anhand der Genitalmerkmale eindeutig entweder *P. lineata* oder *P. bresnieri* (Abb. 3 c, d, g, h) zugeordnet werden. Selbst bei den durch den Autor großgezogenen 6 Nachkommen eines der aufgesammelten Weibchen war die Variationsbreite der Genitalstrukturen so groß, dass man die einzelnen Tiere anhand der von Metzner (1999) gezeigten Unterschiede zwischen beiden Arten, teilweise der einen oder der anderen Art hätte zuordnen können. Die Bestimmung erfolgte daher anhand des von Metzner (1999) beschriebenen Habitus beider Arten. Dabei konnten sowohl die beiden auf Kos eingesammelten Tiere als auch alle Nachkommen des Weibchens zweifelsfrei *P. lineata* zugeordnet werden.

Ob eine Unterscheidung beider Arten anhand ihrer Genitalmorphologie überhaupt möglich ist oder ob es sich sogar um ein und dieselbe Art handelt, muss an dieser Stelle offen bleiben. Dass die ganze *P. bresnieri*-Artengruppe einer Revision bedarf, die auch mögliche Unklarheiten hinsichtlich des Artstatus von *P. lineata* klären sollte, merkten schon Logunov & Azarkina (2006) an.

Plexippoides gestroi **(Dalmas, 1920)**
GRIECHENLAND: L14, unter Stein, 21.06.2014: 1 juv – Reifehäutung 06.11.2014: 1♂; L14, unter Stein, 26.06.2014: 1♀; L12, Mauer, 26.06.2014: 1 juv – Reifehäutung 06.06.2015: 1♀; L8, auf Stein, 26.06.2014: 1 juv – Reifehäutung 04.11.2014: 1♂. Bestimmung: Metzner (1999). Verbreitung: östlicher Mittelmeerraum (World Spider Catalog 2015). Neu für Kos.

Plexippus paykulli **(Audouin, 1826)**
GRIECHENLAND: L4, im Haus, 21.06.2014: 1 juv – Reifehäutung 29.05.2015: 1♂; L18, Mauer, 22.06.2014: 1♂; L11, Mauer, 23.06.2014: 1♀. Bestimmung: Metzner (1999). Verbreitung: kosmopolitisch (World Spider Catalog 2015). Neu für Kos.

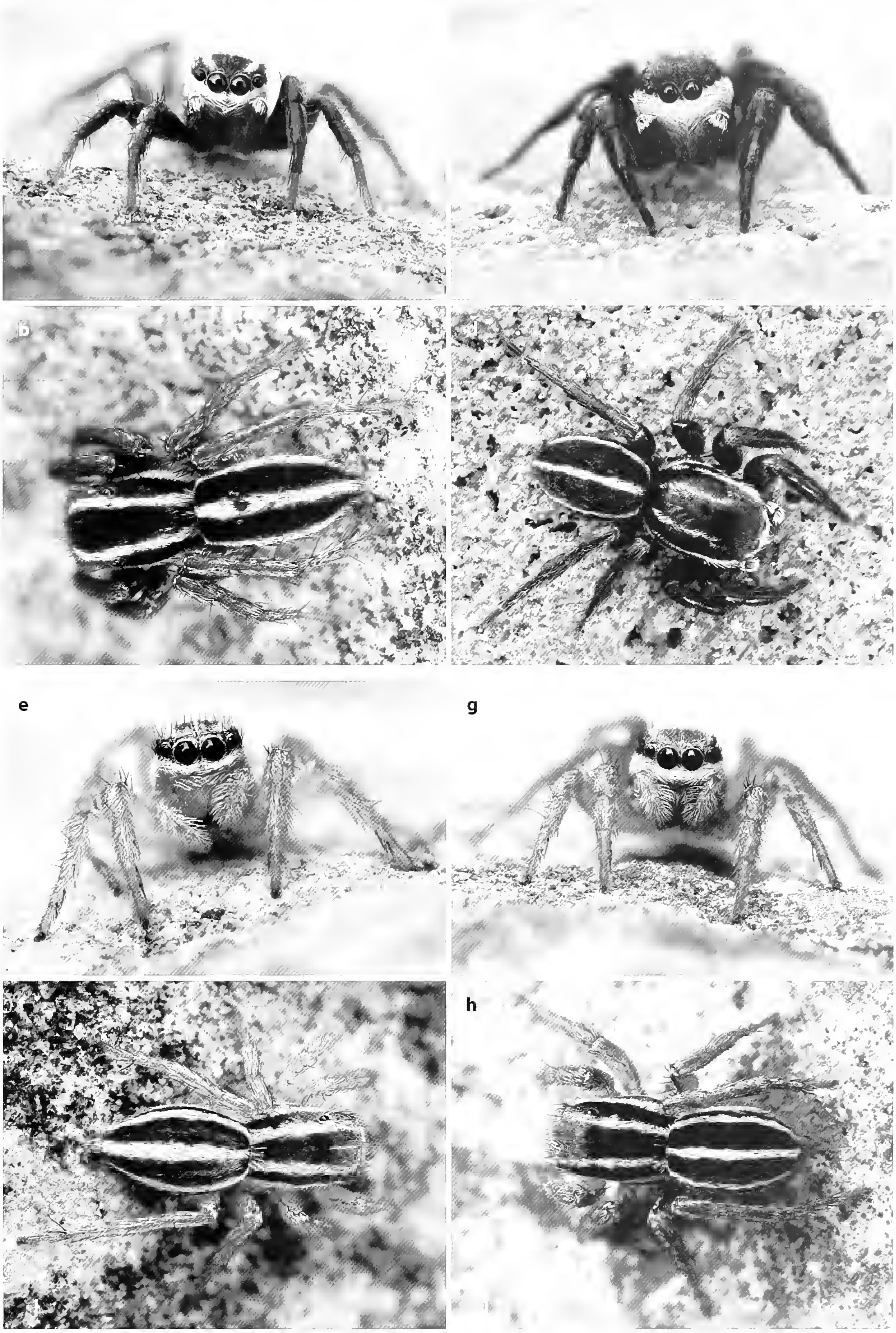

Abb. 3/Fig. 3:
Phlegra lineata,

a. Männchen von Kos, Frontalansicht;
b. Männchen von Kos, Dorsalansicht;

a. male from Kos, habitus frontal;
b. male from Kos, habitus dorsal;

c. *Phlegra bresnieri,* Männchen von Sardinien, Frontalansicht;
d. Männchen von Sardinien, Dorsalansicht;

c. *Phlegra bresnieri,* male from Sardinia, habitus frontal;
d. male from Sardinia, habitus dorsal;

e. *Phlegra lineata,* Weibchen von Kos, Frontalansicht;
f. Weibchen von Kos, Dorsalansicht;

e. *Phlegra lineata,* female from Kos, habitus frontal;
f. female from Kos, habitus dorsal;

g. *Phlegra bresnieri,* Weibchen von Elba, Frontalansicht;
h. Weibchen von Elba, Dorsalansicht

g. *Phlegra bresnieri,* female from Elba, habitus frontal;
h. female from Elba, habitus frontal

Pseudicius badius **(Simon, 1868)**
GRIECHENLAND: L16, an Rinde, 20.06.2014: 1♂. Bestimmung: Metzner (1999). Verbreitung: Spanien bis Iran (World Spider Catalog 2015). Neu für den Dodekanes.

Sitticus distinguendus **(Simon, 1868)** (Abb. 4 a-d)
GRIECHENLAND: L17, Schlickboden, 25.06.2014: 1♀. Bestimmung: Metzner (1999). Verbreitung: Paläarktis (World Spider Catalog 2015). Neu für Kos.

Das gesammelte Tier weist genitalmorphologisch geringfügige Unterschiede zur Normalform der Art auf, bei der die seitlichen Drüsengänge der Vulva (Abb. 4 b) gewöhnlich nicht so lang sind. Um diese Variation klar einordnen zu können, bedarf es laut Dmitri Logunov (in litt.) der Untersuchung weiterer Tiere vom Fundort. Vor allem ist zu klären, ob gegebenenfalls auch Unterschiede in der Struktur des männlichen Palpus vorhanden sind.

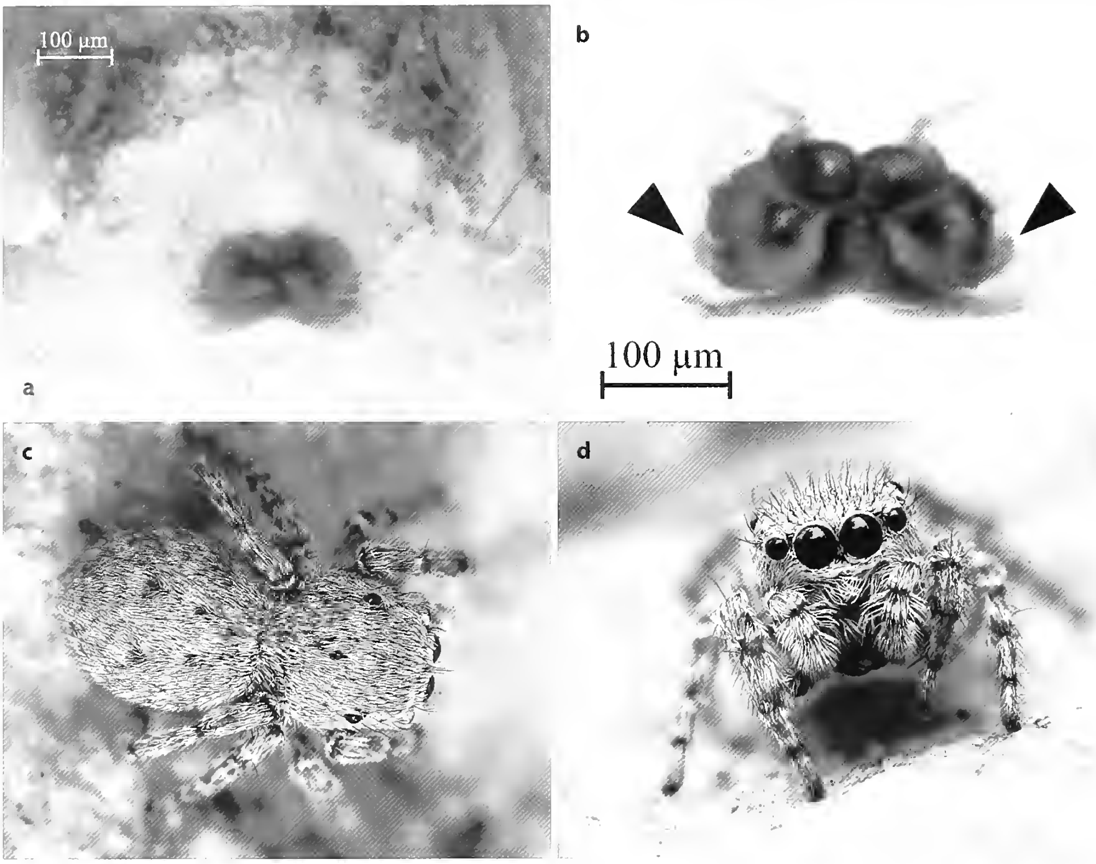

Abb. 4/Fig. 4:
Sitticus distinguendus,

a. Weibchen, Epigyne (am Tier);
b. Weibchen, Vulva;

a. female, epigyne (not dissected);
b. female, vulva;

c. Weibchen, Dorsalansicht;
d. Weibchen, Frontalansicht

c. female, habitus dorsal;
d. female, habitus frontal

***Thyene imperialis* (Rossi, 1846)**
GRIECHENLAND: L17, in Binsen, 25.06.2014: 2juv – Reifehäutung 01.08.2014: 1♂, 09.08.2014: 1♂. Bestimmung: Metzner (1999). Verbreitung: alte Welt (World Spider Catalog 2015). Neu für Kos.

Diskussion

Auf der Insel Kos wurden bisher lediglich 14 Arten aus der Familie der Salticidae nachgewiesen (Bosmans & Chatzaki 2005, Logunov 2015, Metzner 1999). Die Angabe zum Vorkommen von *Aelurillus aeruginosus* (Simon, 1871) in Russell-Smith et al. (2011) ist falsch. Sie beruht auf einem Editierfehler und wird durch den Autor in einer späteren Publikation berichtigt (Russell-Smith in litt.).

Im Verhältnis zu den 54 Springspinnenarten, die bisher für den gesamten Dodekanes nachgewiesen wurden (Bosmans & Chatzaki 2005, Logunov 2015, Metzner 1999), ist die Anzahl der für Kos nachgewiesenen Arten sehr gering. Die Hauptursache dürfte die eher mangelhafte Erforschung der dortigen Spinnenfauna sein. Dass noch mehr Arten zu erwarten sind, zeigt die mit 45 Arten (Bosmans & Chatzaki 2005, Logunov 2015, Metzner 1999) deutlich größere Nachweisliste der Kos klimatisch sehr ähnlichen und ebenfalls im Dodekanes gelegenen Insel Rhodos, deren Spinnenfauna unter anderem schon Mitte des letzten Jahrhunderts umfangreich dokumentiert wurde (Caporiacco 1948).

Mit den in dieser Arbeit 12 neu nachgewiesenen Arten wird die Liste der Springspinnen-Nachweise für die Insel Kos von ursprünglich 14 auf jetzt 26 fast verdoppelt (Tab. 2). Dabei gelten die Arten *Euophrys rufibarbis* (Simon, 1868), *Heliophanus equester* L. Koch, 1867, *Menemerus taeniatus* (L. Koch, 1867), *Phlegra lineata* (C. L. Koch, 1846), *Pseudicius badius* (Simon, 1868) gleichzeitig als neu für den gesamten Bereich des Dodekanes, dessen Inventar an Salticidae sich damit von 54 (Bosmans & Chatzaki 2005, Logunov 2015, Metzner 1999) auf 59 Arten erhöht.

Danksagung
Ich danke Elisabeth Bauchhenß, Theo Blick und Sascha Buchholz für ihre Unterstützung während der Erstellung dieses Manuskripts, Dmitri Logunov und Wanda Wesolowska für ihre Hilfe bei der Bestimmung von *Sitticus distinguendus* bzw. *Heliophanus kochii* und Robert Bosmans und Anthony Russell-Smith für die prompte und unproblematische Beantwortung meiner Nachfragen bezüglich ihrer Arbeiten. Außerdem möchte ich Rainer Breitling für die Übersetzung der Zusammenfassung ins Englische danken.

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Tab. 2: Für die Insel Kos nachgewiesene Salticidae
Tab. 2: Records of Salticidae from the Island of Kos

Art	neu für Kos	neu für den Dodekanes	Referenz
Aelurillus blandus (Simon, 1871)			Bosmans & Chatzaki 2005, Metzner 1999, dieser Beitrag
Chalcoscirtus infimus (Simon, 1868)	+		dieser Beitrag
Cyrba algerina (Lucas, 1846)			Bosmans & Chatzaki 2005, Metzner 1999, dieser Beitrag
Euophrys rufibarbis (Simon, 1868)	+	+	dieser Beitrag
Evarcha jucunda (Lucas, 1846)			Bosmans & Chatzaki 2005, Metzner 1999
Habrocestum egaeum Metzner, 1999			Bosmans & Chatzaki 2005, Metzner 1999, dieser Beitrag
Heliophanus equester L. Koch, 1867	+	+	dieser Beitrag
Heliophanus kochii Simon, 1868			Bosmans & Chatzaki 2005, Metzner 1999, dieser Beitrag
Leptorchestes mutilloides (Lucas, 1846)			Strand 1917, Bosmans & Chatzaki 2005
Menemerus semilimbatus (Hahn, 1829)			Bosmans & Chatzaki 2005, Logunov 2015, Metzner 1999, dieser Beitrag
Menemerus taeniatus (L. Koch, 1867)	+	+	dieser Beitrag
Mogrus neglectus (Simon, 1868)			Bosmans & Chatzaki 2005, Metzner 1999, dieser Beitrag
Pellenes arciger (Walckenaer, 1837)	+		dieser Beitrag
Pellenes diagonalis (Simon, 1868)	+		dieser Beitrag
Pellenes ostrinus (Simon, 1868)			Bosmans & Chatzaki 2005, Metzner 1999
Philaeus chrysops (Poda, 1761)			Logunov 2015, Metzner 1999, dieser Beitrag
Phlegra fasciata (Hahn, 1826)			Bosmans & Chatzaki 2005, Metzner 1999, dieser Beitrag
Phlegra lineata (C. L. Koch, 1846)	+	+	dieser Beitrag
Plexippoides gestroi (Dalmas, 1920)	+		dieser Beitragr
Plexippus paykulli (Audouin, 1826)	+		dieser Beitrag
Pseudeuophrys vafra (Blackwall, 1867)			Caporiacco 1929, Bosmans & Chatzaki 2005
Pseudicius badius (Simon, 1868)	+	+	dieser Beitrag
Saitis tauricus Kulczyński, 1905 *			Bosmans & Chatzaki 2005, Metzner 1999
Sitticus distinguendus (Simon, 1868)	+		dieser Beitrag
Synageles dalmaticus (Keyserling, 1863)			Bosmans & Chatzaki 2005, Metzner 1999
Thyene imperialis (Rossi, 1846)	+		dieser Beitrag

* Alle für den Dodekanes noch in Metzner (1999) aufgeführten Nachweise der Arten *Saitis barbipes* (Simon, 1868) und *Saitis graecus* Kulczyński, 1905 wurden in Bosmans & Chatzaki (2005) zur Art *Saitis tauricus* Kulczyński, 1905 gestellt.

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On the new record of the sheet-web spider *Erigonoplus foveatus* comb. nov. from Slovakia, with comments on *Erigonoplus simplex* (Araneae: Linyphiidae)

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Abstract. *Mecynargus foveatus* (Dahl, 1912) was recorded in the territory of Slovakia for the first time. Within two years of spider research, a single adult male was collected by beating branches of Scots pine (*Pinus sylvestris*) in the Borská nížina lowland. We also discovered that specimens of *Erigonoplus simplex* Millidge, 1979 from Bulgaria were misidentified as *M. foveatus*. Therefore, we suggest to consider *E. simplex* as a new record for Bulgaria and to exclude *M. foveatus* from the spider fauna of Bulgaria. A revised distribution of both species is presented and discussed. Based on the high similarity to *Erigonoplus*, *M. foveatus* is transferred to this genus as *Erigonoplus foveatus* (Dahl, 1912) **comb. nov.**

Keywords: Erigoninae, first records, faunistics, Scots pine, Southern Bulgaria, Western Slovakia

Zusammenfassung. Erstnachweis der Zwergspinne *Erigonoplus foveatus* comb. nov. für die Slowakei, mit Anmerkungen zu *Erigonoplus simplex* (Araneae: Linyphiidae). *Mecynargus foveatus* (Dahl, 1912) wurde erstmals in der Slowakei gefunden. Bei zweijährigen Untersuchungen wurde ein einziges Männchen erfasst, per Klopfen an Ästen der Waldkiefer (*Pinus sylvestris*) im Borská nížina lowland (Tiefland von Zahorie, im weiteren Sinne zum Wiener Becken gehörend). Weiterhin stellate sich heraus, dass Exemplare von *Erigonoplus simplex* Millidge, 1979 aus Bulgarien als *M. foveatus* fehlbestimmt waren. Daher betrachten wir *E. simplex* als neuen Nachweis für Bulgarien und *M. foveatus* muss für die bulgarische Fauna gestrichen werden. Die Verbreitung beider Arten wurde überarbeitet, wird als Karte präsentiert und diskutiert. Basierend auf der Ähnlichkeit mit der Gattung *Erigonoplus*, wird *M. foveatus* zu dieser Gattung als *Erigonoplus foveatus* (Dahl, 1912) **comb. nov.** gestellt.

During a long-term research project on arboreal spiders from pines, a new species for Slovakia was found in the Borská nížina lowland. A single male identified as *Mecynargus foveatus* (Dahl, 1912) was collected by beating pine branches at the end of July 2014. Up to now only two species from this genus are known from Slovakia: *M. longus* (Kulczyński, 1882) and *M. morulus* (O. P.-Cambridge, 1873). Both are considered as rare and endangered species that occur in the alpine zone of the High Tatra Mts. (Gajdoš & Svatoň 1994, Svatoň & Kovalčik 2006). The original description of *M. foveatus* was based on females collected on the sunny meadow Herrscherberg (Brodowin) in Germany (Dahl 1912). The currently known distribution of *M. foveatus* is in Europe from France to Central European Russia (Nentwig et al. 2015).

During our detailed research, we also discovered that specimens of the similar species, *Erigonoplus simplex* Milidge, 1979, from Bulgaria were mistaken as *M. foveatus*. The former taxon is considered to be a Mediterranean species (Schröder et al. 2011), which has been reported only from Italy, France and Greece so far (Nentwig et al. 2015). The female of *E. simplex* has not been formally described, however it seems to have been collected by several arachnologists (e.g. Murphy & Murphy 1984, Russell-Smith 2014). Only one species of this genus, *Erigonoplus spinifemuralis* Dimitrov, 2003 has been as yet reported from Bulgaria (Blagoev et al. 2015).

In the present study we provide a short description of the morphology of *M. foveatus* and compare its distribution with that of *E. simplex*. Moreover, we suggest excluding *M. foveatus* from the spider fauna of Bulgaria and to include *E. simplex* as a new species for Bulgaria. We also propose the new combination *Erigonoplus foveatus*, comb. nov.

Material and methods

A managed Scots pine forest close to the Záhorie Protected Landscape Area was examined. About 100-year old pine trees with grassy undergrowth are located north of the village of Studienka (N48.540°, E17.141°, 216 m a.s.l.) near a meadow (Fig. 1). The study plot has been visited in approximately monthly intervals since 2013. Material was collected using the beating method and spiders were fixed in 70% ethanol directly in the field. Microphotographs were made using the EOS Utility software and a digital camera (Canon EOS 100D) connected to a stereomicroscope (Intraco Micro STM 823 5410). Photographs and figures were made by the second author, unless indicated otherwise. Identification of spiders was carried out according to the online key of Nentwig et

Fig. 1: The 100 year-old Scots pine forest at the study plot, near the village of Studienka (SW Slovakia), where *Erigonoplus foveatus* was collected (photo by M. Kulfan)

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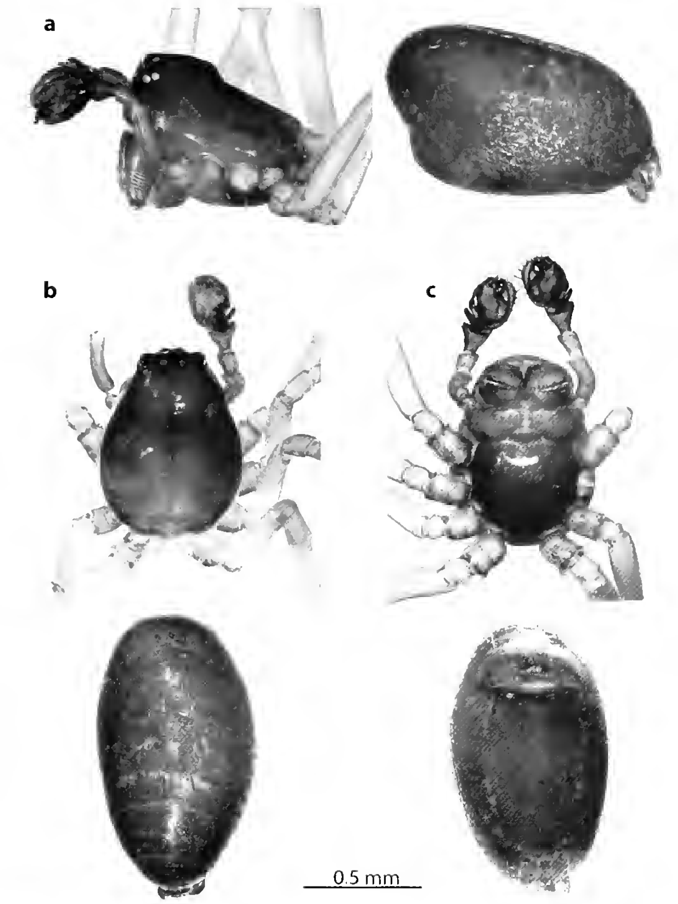

Fig. 2: Male habitus of *Erigonoplus foveatus* from Slovakia; **a.** lateral view; **b.** dorsal view; **c.** ventral view

al. (2015). Palpal morphology follows Hormiga (2000) and nomenclature follows the World Spider Catalog (2015). The single specimen of *M. foveatus* discovered here is deposited in the Western Slovakian Museum in Trnava. For more details about collection and the study plot of *E. simplex* [misidentified as *M. foveatus*] see Lazarov (2005).

Results and discussion

Erigonoplus foveatus (Dahl, 1912) comb. nov.

Figs 2–4

Savignia foveata Dahl, 1912

For a complete list of references, see the World Spider Catalog (2015).

Material examined: A single male was collected by the first author on 26th July 2014 by beating Scots pine near Studienka village (Western Slovakia). Unfortunately we cannot be sure about the geographic coordinates of the exact place of collection, because there are ten randomly numbered samples from this locality.

Comment on taxonomy, new combination

The taxonomic status of *M. foveatus* within the genus *Mecynargus* was previously discussed. This species has already been combined with several other genera, such as *Savignia*, *Rhaebothorax* and *Eboria* (Moritz 1973, World Spider Catalog 2015). Murphy & Murphy (1984) considered *M. foveatus* to be a synonym of *Erigonoplus simplex*. They discussed this problem with Dr. A. F. Millidge who, however, did not confirm

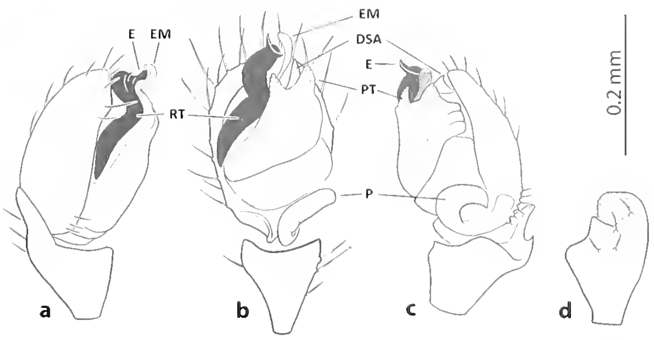

Fig. 3: Male left palp of *Erigonoplus foveatus* from Slovakia; **a–c.** bulbus and tibia; **a.** prolateral view; **b.** retrolateral view; **c.** ventral view; **d.** dorsal view of palpal tibia. DSA = distal suprategular apophysis; E = embolus; EM = embolic membrane; P = paracymbium; PT = protegulum; RT = radical tailpiece

the synonymy but agreed that *M. foveatus* it closely related to *E. simplex* and should be placed in the genus *Erigonoplus*. The male of *M. foveatus* has outstanding copulatory organs and hence cannot be mistaken for any other species of the genus *Mecynargus*, although it is closely related to the genus *Erigonoplus* (with its type species *E. inclarus* (Simon, 1881), see Millidge 1975) and we herewith transfer it to this genus as *Erigonoplus foveatus* (Dahl, 1912), **comb. nov.**

Diagnosis

Erigonoplus foveatus can be confused with the rare Mediterranean species *Erigonoplus simplex* Millidge, 1979. Unlike *E. foveatus*, *E. simplex* lacks the elevated head region (Fig. 4), and can be distinguished by its larger body size. Males of *E. simplex* are ca 2.45 mm long in comparison to *E. foveatus* which is 1.9–2.0 mm long (Nentwig et al. 2015). Male palps of both species are very similar.

Description of the Slovakian *Erigonoplus foveatus* sample

Male (Fig. 2): Total length 1.84 mm, carapace length 0.77 mm and width 0.6 mm.

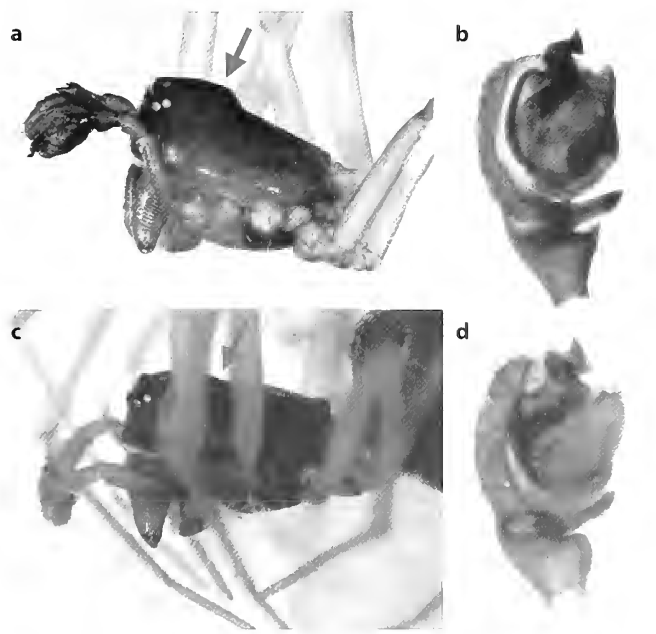

Fig. 4: Comparison of *Erigonoplus foveatus* (Slovakia) with *E. simplex* (Bulgaria, photo by C. Deltshev). Arrows point to the head elevation. **a–b.** *E. foveatus*; **c–d.** *E. simplex*; **a, c.** lateral view; **b, d.** ventral view of male palp

Tab. 1: Distribution and habitat preferences of *Erigonoplus foveatus*

State	Habitat	References
Austria	rocky and grassy steppe, alpine zone	Thaler (1969), Murphy & Murphy (1984), Milasowsky et al. (2009)
Belarus	fields	Eskov (1988), Lukashevich (pers. comm)
Czech Republic	open sunny habitats (aeolian sands, sandpits with *Pinus silvestris*)	Buchar & Růžička (2002), Heneberg & Řezáč (2014)
Denmark	steep, south-facing coastal sandy and loamy hills with occasional slides	Scharff & Gudik-Sørensen (2011), Lissner & Scharff (2015), Lissner (pers comm.)
Estonia	moors and shores of rivers	Vilbaste (1987)
Finland	open peat bogs	Koponen (2002), Albrecht et al. (2011), Koponen et al. (2013)
France	dry grassland and pine forest	Ledoux et al. (2003), Le Peru (2007), C.E.N. Midi-Pyrénées (2014)
Germany	sunny grassy locations (grasslands, grass steppe)	Staudt (2015)
Italy	dry and semi-dry grasslands	Thaler (1969), Steinberger (2008)
Latvia	fixed coastal dunes with herbaceous vegetation (grey dune)	Cera & Spungis (2013)
Lithuania	meadow of the river terraces	Biteniekyte & Relys (2004)
Poland	sunny and open habitats, xerothermic grassland, orchards	Rozwałka et al. (2014)
Russia	grass and rocky steppe, oligotrophic bog-forest (*Pinus silvestris*)	Tanasevitch (2011), Kamayev (2012), Tanasevitch & Alekseenko (2012), Tuneva & Esyunin (2012), Martynovchenko & Mikhailov (2014)
Serbia	meadow-steppe	Grbić et al. (2015), Grbić (pers. comm.)
Slovakia	pine forest (*Pinus silvestris*) on sand dunes	present paper
Slovenia	grassland	Čandek et al. (2013)
Switzerland	dry, mosaic of sedges and moors	Hänggi (1993), CSCF-karch (2015)
Ukraine	grasslands, pastures	Evtushenko (1993), Evtushenko et al. (2012)

Dark brown shiny carapace with elevated head and shallow medial groove; chelicerae on outer side with distinct stridulatory organ; dark brown shiny sternum; legs yellow, coxa 4 with small conical spur. Abdomen dark grey, without pattern, book lung opercula with highly developed stridulatory areas.

Male palp (Fig. 3): Pedipalp tibia with complex apophysis consists of larger concave rounded one with small pointed spur. Protegulum with a small process; radical tailpiece spiral; embolic membrane present; embolus barely visible.

Biological and ecological notes

Erigonoplus foveatus is considered to be a xerophilous photobiont species (Thaler 1969, Rozwałka et al. 2014). Although, *E. foveatus* was recorded from peat bogs in Finland and Karelia (NW Russia), it seems to prefer sunny and grassy biotopes in highlands and lowlands (see Tab. 1). This spider was also collected on agrocenoses such as orchards (Rozwałka et al. 2014), pastures (Ratschker & Roth 2000, Evtushenko et al. 2012) and fields (Eskov 1988, Lukashevich pers. comm.). Interestingly some of the records were associated with Scots pine, similar to the present record from Slovakia (see Tab. 1). Although we consider our finding in such a habitat accidental, *E. foveatus* may be a constant species of the Slovak spider fauna as it is known from neighbouring countries (Fig. 5). With regard to previous records, *E. foveatus* may be found in the nearby meadows or on other grassy localities.

This species builds webs usually among the base of grass tussocks (Buchar & Růžička 2002, Ledoux et al. 2003) and in depressions on the bare or sparsely-vegetated ground (Lissner pers. comm.). Adults occur from May to August, with the most active period around June and July (e.g. Thaler 1969, Moritz 1973, Vilbaste 1987, Hänggi 1993, Gnelitsa 2011). Females were also collected in the winter period (Hänggi 1993).

Tab. 2: Distribution and habitat preferences of *Erigonoplus simplex*

State	Habitat	References
Bulgaria	Submediterranean climate	Lazarov (2005)
France	unknown	Murphy & Murphy (1984), Le Peru (2007)
Greece	in grass undergrowth in old olive grove, under rocks below waterfall, on the rocks on the coast	Schröder et al. (2011), Lecigne (2013), Russell-Smith (2014)
Italy	unknown	Millidge (1979)

Distribution

Erigonoplus foveatus is a rare species occurring in Europe from southern France (Pyrenees) to Russia (Karelia, Ural and Caucasus) (Fig. 5, Tab. 1). In cooperation with Dr. Christo Deltshev we revised the Bulgarian material published by Lazarov (2005) and *Erigonoplus simplex* was misidentified as *E. foveatus*. Consequently, we argue that *E. simplex* should be treated as a new record for Bulgaria and that *E. foveatus* has not yet been recorded there.

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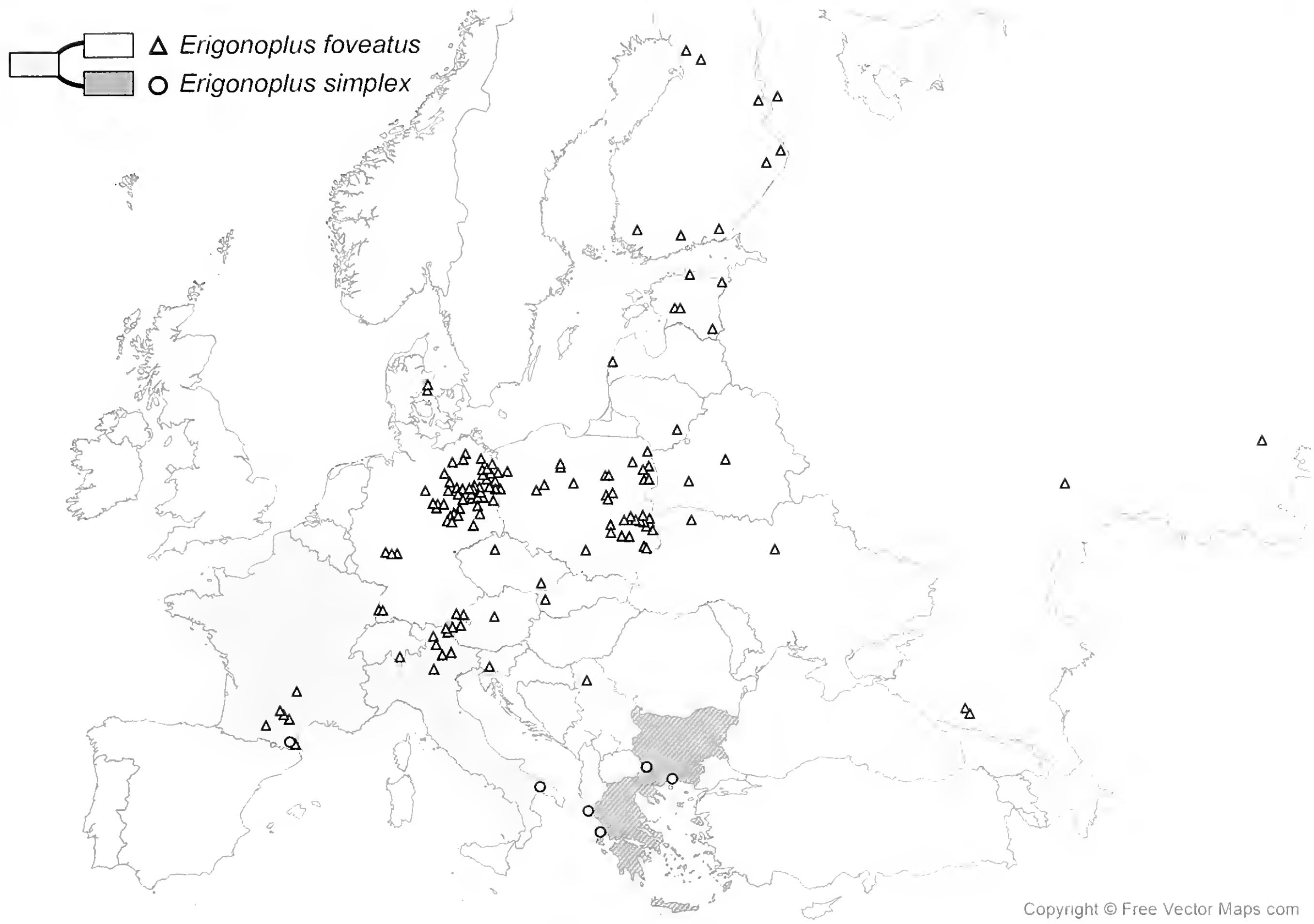

Fig. 5: Distribution of *Erigonoplus foveatus* and *E. simplex* (for references see Tabs 1, 2)

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Scientific heritage of Alexandru Roşca: publications, spider collection, described species

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Abstract: The scientific heritage of the Romanian arachnologist Alexandru Roşca (publications, spider collection, and described species) was surveyed. For almost 40 years Alexandru Roşca studied the spiders from territories that are now parts of Romania, Ukraine, Bulgaria, and Moldova. Despite political repression, Roşca made a significant contribution to the study of the spiders of Romania and bordering countries, reflected in his 19 papers including the Ph.D. thesis. A complete list of Roşca's papers is presented. The 'Alexandru Roşca' spider collection is deposited in the Grigore Antipa National Museum of Natural History (Bucharest, Romania). According to the register it includes 596 species (1526 specimens) of spiders. Part of the collection was revised by different scientists and later by the present authors. During the period 1931–1939, Roşca described 13 spider species. To date, five species names have been synonymised. We propose that six species should be treated as **nomina dubia** because of their poor descriptions and lack of availability of types and/or other specimens. For two of Roşca's species, *Pardosa roscai* (Roewer, 1951) and *Tetragnatha reimoseri* (Roşca, 1939), data and figures are presented and information on them is updated.

Keywords: *Pardosa roscai*, Romania, spider collection, *Tetragnatha reimoseri*

The analysis of historical data (including literature data and collections) is important for obtaining complete information on spider diversity and composition, for defining habitat preferences of species, for estimating faunal change due to human impacts on habitats and climate change and thus for nature conservation management (Helsdingen 2000, Aakra 2009, Fedoriak et al. 2012, Komposch 2015). The Romanian spider fauna is relatively well studied. The first list of Romanian spiders was published by Fuhn & Oltean (1970). Dumitrescu (1979) published the 'Bibliographia Arachnologica Romanica', which included a list of more than 300 papers on both Romanian and foreign arachnids written by Romanian authors as well as the contributions of foreign specialists on Romanian arachnological material. The detailed analysis of the history of arachnological studies in Romania was published soon after (Dumitrescu 1981). The most recent checklist of the fauna was published by Weiss & Petrişor (1999) and it was updated and published online by Weiss & Urák (2000) who presented 972 species. Since then a number of additional species were recorded for Romania (Moscaliuc 2013).

An important contribution to spider fauna studies in Romania and adjacent countries was made during the period 1930–1968 by the Romanian arachnologist Alexandru Roşca. However, complete information about his publications, described species, material deposited in the 'Alexandru Roşca' collection in the Grigore Antipa National Museum of Natural History (Bucharest, Romania) as well as an analysis of his records for the territories that are now parts of Romania, Ukraine, Bulgaria and Moldova is still lacking.

Alexandru Roşca's life (2.10.1895–7.8.1969) was significantly influenced by historical events during the 20th century. He survived two world wars, overcame cancellation of his scientific degree and dismissal from the University (October 16, 1947) and was later rehabilitated (January 29, 1964). Despite these hardships, he made a significant contribution to the study of the spiders of Romania and bordering countries.

The aim of the present study is to provide a complete list of Roşca's arachnological publications and to provide information about the current status of his collection and the described spider species.

Material and methods

We obtained information about the scientific heritage of Alexandru Roşca from the publications and documents stored in the libraries of Chernivtsi National University (Chernivtsi, Ukraine), the Vernadsky National Library (Kyiv, Ukraine), the National Library of Belarus (Minsk, Belarus), the Mihai Eminescu Central University Library (Iaşi, Romania), the Scientific Library of the Grigore Antipa National Museum of Natural History (Bucharest, Romania) as well as in Roşca-Toderaş family archive.

We digitalised the register of the 'Alexandru Roşca' collection deposited in the Grigore Antipa National Museum of Natural History. The complete and unchanged data from the original register dating back to 1972 are available (Fedoriak 2015: pp. 144-161). It provides the following data: name of the taxa (596 species in 21 families), number of specimens per species, locality (mostly names of settlements), and the date of collecting. Until recently the material had no inventory numbers. The revision of different parts of the collection was done by different arachnologists who rearranged specimens in glass tubes and placed them in plastic jars with 70% alcohol (Petrişor 1999, Fedoriak & Moscaliuc 2013). The rest of the collection is in the same condition as it was received and requires reorganization and verification.

We collected information on the results of previous revisions of the 'Alexandru Roşca' collection. These results are available in different forms:

a) published data (Braun 1982, Urak & Weiss 1997, Petrişor 1999, Fedoriak & Moscaliuc 2013);
b) notes in the register of the 'Alexandru Roşca' collection;
c) additional labels which were added to Salticidae specimens by I. E. Fuhn.

Photographs were taken by Liviu A. Moscaliuc using a Leica 205C stereomicroscope with a mounted Canon EOS 60D camera and were processed with 'Windows 10 Photos'

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and various photo stacking software packages. The pictured specimens are part of the arachnological collections of Department of Zoology, Institute of Biology, Siedlce University of Natural Sciences and Humanities (Poland), Grigore Antipa National Museum of Natural History (MNINGA, Romania) and C. Deltshev's private collection (Bulgaria).

Results

According to the register of the 'Alexandru Roşca' collection deposited in the Grigore Antipa National Museum of Natural History (Bucharest, Romania), the first spider material was collected in May 1928; the last material was collected in May 1966. For almost 40 years he studied spiders in the territories that are now parts of Romania, Ukraine, Bulgaria and Moldova.

Roşca also studied spiders from different regions of Romania. In general, he provided data on spiders per study region as follows: Bucovina in six publications including his thesis (Roşca 1930, 1935, 1936a, 1936b, 1937b, 1938a), Moldova in five publications (Roşca 1937a, 1938c, 1946a, 1946b, 1968), Transylvania in three publications (Roşca 1932, 1958, 1959), Dobrogea in two publications (Roşca 1938b, 1939), Bessarabia in one paper (Roşca 1940).

Two of Roşca's publications are not faunistic. One of them concerns the interpretation of the notion of "biotope" and provides information about biotope preferences of some spider species (Roşca 1943). The second one deals with the silk collar that can be found around some of the burrows dug by *Hogna vultuosa* [= *Geolycosa vultuosa* (C.L. Koch, 1838)]. This silk collar, as Roşca noted, is used to protect the spiderlings in their first stages of life (until pigmented) against debris and powerfull sunlight (Roşca 1947).

Roşca and his family managed to save the collection of spiders. According to the certificate #1582 dating back to 26.7.1972, the Grigore Antipa National Museum of Natural History acquired the collection of 1526 specimens representing 596 Araneae species sold by Olivia Toderaş (Alexandru Roşca's daughter). The collection came in handmade cardboard boxes containing glass vials with rubber covers and was accompanied by the register. Until now only a part of the collection has been reorganized and verified (Tab. 1).

Currently 506 specimens from the collection have been verified (some of them twice by different arachnologists), 296 are under the process of verification and 724 require reorganization and verification (Tab. 1).

During the period 1931–1939, Roşca described 13 spider species from the territories that now are parts of Romania, Ukraine and Bulgaria. So far no type material was found in 'Alexandru Roşca' collection.

To date, five species names have been synonymised: *Aranea multipunctata* Roşca, 1935 [= *Larinioides ixobolus* (Thorell, 1873)]; *Theridium botezati* Roşca, 1935 [= *Phylloneta impressa* (L. Koch, 1881)]; *Coelotes intermedius* Roşca, 1935 [= *Inermocoelotes falciger* (Kulczyński, 1897)]; *Arctosa turbida* Roşca, 1935 [= *Arctosa stigmosa* (Thorell, 1875)]; *Acantholycosa trajani* Roşca, 1939 [= *Pardosa nebulosa* (Thorell, 1872)].

Six of Roşca's species are here considered doubtful:

Ceratinella marcui Roşca, 1932: the description of this species was based only on one specimen. The description of size and colour/tegument sculpture as well as the habitat in which it was collected is rather indicative for several other species within this genus. The epigyne is represented very schematically and looks similar to *C. brevipes*, *C. wideri* and *C. scabrosa*.

Diplocephalus subrufus Roşca, 1935 [= *Diplocephalus alpinus subrufus* Roşca, 1935] was described based on a male and a female. It was given subspecific status as *Diplocephalus connectens subrufus* (Drensky 1939). Drensky noted that he had not examined the specimens. Roşca stated that the difference between his species and *D. connectens* was the lack of a sulcus between the anterior median and posterior median eyes, thus his species has a single peaked conical head region compared to a double pointed head region of *D. connectens*. But the description and the figures do not allow us to distinguish it from other possibly related species.

Walckenaera fusca Roşca, 1935 is a species described by Roşca based on one female only. In the description the author

Tab. 1: Information on the revised material from 'Alexandru Roşca' spider collection (Family names and data as in original)

Family	Species	Specimens	Notes
Araneidae	50	183	Requires reorganization and verification
Gnaphosidae	39	71	Requires reorganization and verification
Xysticidae	82	296	Under the process of verification
Theridionidae	40	104	Verified by Fedoriak & Moscaliuc (2013)
Hahniidae	2	3	Requires reorganization and verification
Lycosidae	61	165	Verified by Petrişor (1999). This part of the collection contains 12 specimens of Pisauridae which were also verified by Fedoriak & Moscaliuc (2013)
Argyronetidae	1	2	Verified by Petrişor (1999)
Sicariidae	1	4	Requires reorganization and verification
Zoridae	2	11	Requires reorganization and verification
Dysderidae	8	10	Verified by Petrişor (1999)
Linyphiidae	43	105	Requires reorganization and verification
Micryphantidae	96	149	Requires reorganization and verification
Clubionidae	56	124	Requires reorganization and verification
Salticidae	49	138	Verified by Fuhn & Gherasim (1995) and recently by Moscaliuc & Fedoriak (2015)
Dictynidae	27	73	Requires reorganization and verification
Pholcidae	2	15	Verified by Fedoriak & Moscaliuc (2013)
Mimetidae	2	2	Verified by Fedoriak & Moscaliuc (2013)
Eresidae	1	1	Require reorganization and verification
Oxyopidae	2	12	Verified by Fedoriak & Moscaliuc (2013)
Agelenidae	23	34	Verified by Petrişor (1999)
Tetragnathidae	9	24	Verified by Petrişor (1999)
Totals	**596**	**1526**	

differentiated it from *W. obtusa* Blackwall, 1836 by variations in epigyne morphology. However, the latter species has an epigyne morphology (with a trapezoidal plate in the middle) that is quite different from Roşca's description of an inverted arch-like epigyne opening.

Centromerus crinitus Roşca, 1935 is another species that Roşca described on based on one female only and compared it with *C. similis* [= *Centromerus sellarius* (Simon, 1884)]. However, the provided figure is rather a conundrum and of no help for any comparison.

For *Tarentula strandi* Roşca, 1936 and *Tarentula roeweri* Roşca, 1937 both sexes were described and illustrated. They were recognized and placed within the genus *Alopecosa* by Fuhn & Niculescu-Burlacu (1971). However, the authors mentioned that they searched for them but found no specimens at the type locality.

We propose that these six species should be designated **nomina dubia** because of their poor descriptions and the unavailability of types or other specimens.

Two of Roşca's species are valid and information on them is updated: *Eucta reimoseri* Roşca, 1939 [= *Tetragnatha reimoseri* (Roşca, 1939)] and *Lycosa maculata* Roşca, 1939 [= *Pardosa roscai* (Roewer, 1951)].

***Pardosa roscai* (Roewer, 1951)** (Fig. 1)

Illustrated material. BULGARIA: 1♂1♀, Shabla town (43.53794°N, 28.53523°E), Tuzlata place, 28.6.1993, leg. & det. C. Deltshev.

Other examined specimens. ITALY: fragments (the material is macerated probably due to a poor preservative) (MNINGA inv.nr. ARA 252/1), Toscana, Pisa (43.72284°N, 10.40169°E), 7.6.1958, det. C. Sterghiu. ROMANIA: 2♂♂ (MNINGA inv.nr. ARA 330/1), Grindul Caraorman (45.07746°N, 29.37816°E), 5.5.1967, det. C. Sterghiu; 7♀♀ (MNINGA inv. nr. ARA 330/12), same location, 6.5.1967, det. C. Sterghiu; 4♀♀ (MNINGA inv.nr. ARA 330/13), same location, sand dune, 6.5.1967, det. C. Sterghiu; 14♀♀ (MNINGA inv.nr. ARA 330/15), same location, 5.5.1967, det. C. Sterghiu; 26♀♀ (MNINGA inv.nr. ARA 330/16), same location, 5.5.1967, det. C. Sterghiu; 7♀♀ (MNINGA inv.nr. ARA 330/2), same location, 5.5.1967, det. C. Sterghiu; 1♀ (MNINGA inv. nr. ARA 330/3), same location, 1.5.1957, det. C. Sterghiu; 5♀♀ (MNINGA inv.nr. ARA 330/5), same location, *Juncus* meadow, 5.5.1967, leg. I. Fuhn, det. C. Sterghiu; 2♀♀ 1 subadult ♂ (MNINGA inv.nr. ARA 330/10), same location, 30.4.1957, leg. I. Fuhn, det. C. Sterghiu; 1♀ (MNINGA inv. nr. ARA 330/4), Ciupercenii Noi (43.90768°N, 22.94809°E), 7.05.1973, leg. I. Fuhn, det. C. Sterghiu; 1♀ (MNINGA inv. nr. ARA 330/14), same location, 9.5.1963, leg. I. Fuhn, det. C. Sterghiu; 1♀ (MNINGA inv.nr. ARA 330/11), Ciupercenii Vechi (43.94231°N, 22.89760°E), 7.5.1963, det. C. Sterghiu; 2♀♀ (MNINGA inv.nr. ARA 330/6), Murighiol-Sărături (45.03371°N, 29.15407°E), 10.6.1967, det. C. Sterghiu; 6♀♀ 2 subadult ♂♂ (MNINGA inv.nr. ARA 330/7), Gârla Împuţită (45.09243°N, 29.65179°E), Black Sea shore, 14.10.1970, det. C. Sterghiu; 6♀♀ 1 subadult ♂ (MNINGA inv.nr. ARA 330/9), same location, 14.10.1970, leg. I. Fuhn, det. C. Sterghiu; 4♀♀ 2 subadult ♂♂ (MNINGA inv.nr. ARA 330/8), Sulina cemetery (45.15029°N, 29.67073°E), 16.10.1970, leg. I. Fuhn, det. C. Sterghiu; 1♀ (MNINGA inv.nr. ARA 526/52), Caracal (44.11574°N, 24.34246°E), 7.5.1958, leg. A. Cohen, det. I. Fuhn; 1♀ (MNINGA inv.nr. ARA 526/33), location and date unknown, leg. P. Banarescu.

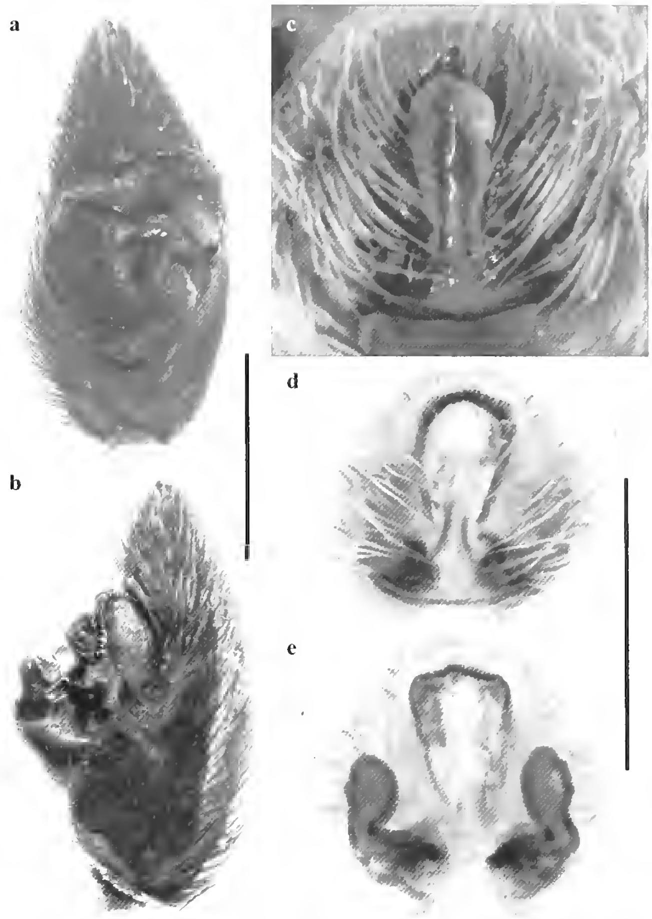

Fig. 1: *Pardosa roscai* (Roewer, 1951). Male and female from Shabla town, Bulgaria: Right pedipalp: **a.** Ventral; **b.** Lateral; **c.** Epigyne (not cleared); **d.** Epigyne (cleared); **e.** Vulva. Scale bars 0.5 mm

Diagnosis. Distinguished from its congeners by the morphology of the genitalia. **Male.** Prosoma dorsum dark brown, darker region inside the eye field. Light median band, irregular in shape. Discontinued lateral bands with faint radial pattern. Palpus dark brown covered with dark hairs. Apical part of the back of the palp covered with a dense field of lighter and shorter setae. Conductor bifurcated, terminal apophysis with an acute, sclerotized end. Long horizontal and tapered embolus (Fig. 1a). **Female.** Similar colouration pattern of prosoma as for the male, different only in the shade of brown which is lighter and slightly reddish. Epigyne with an upturned T shaped septum and double outward facing sclerotized copulatory pockets at the base. Covered with white setae (Fig. 1c-e).

Distribution. Turkey, Bulgaria, Romania (World Spider Catalog 2016, Helsdingen 2015).

***Tetragnatha reimoseri* (Roşca, 1939)** (Figs 2-3)

Illustrated material. POLAND: 1♂ 1♀, Siedlce Ponds (52.19298°N, 22.29157°E), Siedlce, rushes, sweeping with a net, 27.6.2005, leg. & det. I. Hajdamowicz; ROMANIA: 1♂ 1♀ (MNINGA inv.nr. 40002, tube 37), Caraorman (45.08673°N, 29.39596°E), 11.8.1967, leg. X. Palade, det. M. Vasiliu.

Other examined specimens. POLAND: 1♀, Siedlce Ponds (52.19298°N, 22.29157°E), Siedlce, rushes, sweeping with a net, 8.6.2006, leg. & det. M. Oleszczuk; 1♂, same locality,

27.5.2000, leg. & det. P. Jastrzębski; 1♀, same locality, 8.6.2006, leg. & det. P. Jastrzębski. ROMANIA: 1♀ (MNINGA inv. nr. 40002, tube 32), Periprava (45.39962°N, 29.54424°E), 15.9.1966, leg. & det. M. Vasiliu; 2♀♀ 1 subadult ♂ (MNINGA inv.nr. 40002, tube 38), same location, 24.7.1958, leg. A. Cohen, det. M. Vasiliu; 1♀ (MNINGA inv.nr. 40002, tube 39), same location, 27.6.1967, leg. & det. M. Vasiliu; 3 subadult ♀♀ (MNINGA inv.nr. 40002, tube 40), same location, 12.10.1966, leg. X. Palade, det. M. Vasiliu; 1 subadult ♂ (MNINGA inv.nr. 40002, tube 33), Corciovata lake (45.23538°N, 29.28529°E), 29.3.1967, leg. Ş. Torcea, det. M. Vasiliu; 2♀♀ 1 subadult ♂ (MNINGA inv.nr. 40002, tube 34), Caraorman (45.08673°N, 29.39596°E), 8.4.1967, leg. X. Palade, det. M. Vasiliu; 1♂ 7♀♀ (MNINGA inv.nr. 40002, tube 37), same location, 11.8.1967, leg. X. Palade, det. M. Vasiliu; 1 subadult ♂ (MNINGA inv.nr. 40002, tube 35), Crişan (45.18005°N, 29.35145°E), 24.9.1967, leg. I. Paina, det. M. Vasiliu; 7♀♀ 1 subadult ♂ (MNINGA inv.nr. 40002, tube 36), Roşca canal (45.36027°N, 29.39929°E), 9.9.1967, leg. I. Paina, det. M. Vasiliu; 1 subadult ♂ (MNINGA inv.nr. ARA 579, tube 4), Danube Delta, 30.6.1956, det. C. Sterghiu.

Diagnosis. Distinguished from its congeners by the morphology of the genitalia and the unmistakable shape of the abdomen, with the spinnerets placed at about two thirds of its length, marking the beginning of a "tail" (compare with data by Wunderlich (2011: p. 213 & 217) for *Tetragnatha isidis* (Simon, 1880)). General yellow grey colouration, marble abdomen. Powerful prognathous chelicerae (Figs 2-3) with long bifurcated dorsal tooth on the male chelicera (Fig. 3b-d).

Distribution. Austria, Belgium, Germany, Hungary, Italy, Netherlands, Poland and Romania (World Spider Catalog 2016, Helsdingen 2015). Ukraine and Belarus are excluded because misidentifications were reported by Polchaninova & Prokopenko (2013) and Ivanov (2013b).

Fig. 2: *Tetragnatha reimoseri* (Roşca, 1939). Female from Siedlce Ponds, Polands. Chelicera; **a.** Ventral; **b.** Dorsal. Scale bar – 1 mm

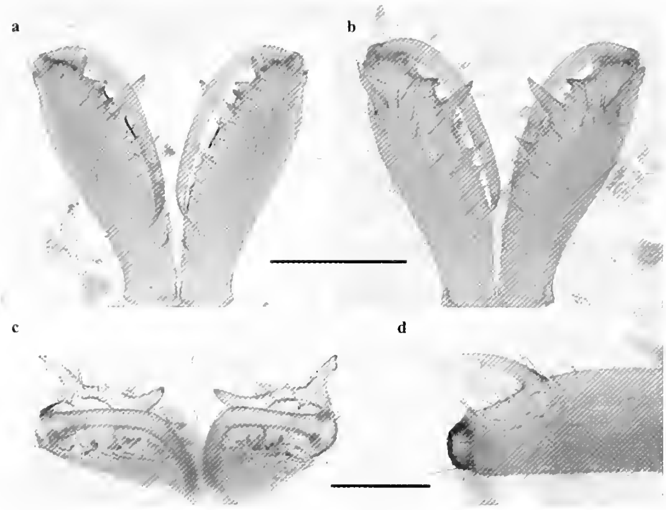

Fig. 3: *Tetragnatha reimoseri* (Roşca, 1939). Male from Caraorman, Română. Chelicerae; **a.** Ventral; **b.** Dorsal; **c.** Frontal; **d.** Bifurcated dorsal tooth. Scale bar – 1 mm/0.5 mm

Discussion

The biographical information and some data about Roşca's collection and publications are available in a few literature sources written in Romanian (Bonnet 1945, Dumitrescu 1979, Bejinariu & Istrate 1998, Ardelean et al. 2000, Vasiliu 2001, Satco 2004, Bejinari 2005). However, the information is often incomplete or erroneous. In particular, Bejinariu (2005) mentioned that the collection of spiders was obtained by the Grigore Antipa National Museum of Natural History in 1970, whereas this occurred in 1972. Some literary sources mention Roşca to be the author of 13 or 15 published works, but in fact 19 of his papers were published. We present all Roşca's papers chronologically in the references with the author's family name as in the original works. Roşca did not complete his 'Romania Spider Catalog'.

It is worth mentioning that there are no type specimens of Roşca's species in the collection but only specimens of two species that were synonymised. There is no Roşca's material in the collection of the Brukenthal National Museum in Sibiu (Romania) (Weiss 1998). Olivia Toderaş (Alexandru Roşca's daughter) convinced us that spiders collected by her father can be found nowadays only in the Grigore Antipa National Museum of Natural History. Neither Roşca nor other members of his family gave specimens to any other person or institution. So we presume that the rest of Roşca's material was lost or destroyed when the family moved.

At the end of 20th century specimens from the 'Alexandru Roşca' spider collection were verified by different arachnologists (Braun 1982, Fuhn & Gherasim 1995, Urak & Weiss 1997, Petrişor 1999, Fedoriak & Moscaliuc 2013).

Braun (1982) analysed species described by Bösenberg, mainly from Germany. He stated that 'of 40 species ... only two are valid (*Theridium bertkaui* = *Theridion boesenbergi*, *Hypomma fulvum* = *Enidia fulva*), 17 are synonyms, 15 seem to be synonymous and 6 are doubtful' (Braun 1982). A number of the 38 nominal species were reported from the Balkan Peninsular. For his revision Braun also analysed specimens asigned to Bösenberg's species from the 'Alexandru Roşca' spider collection. He mentioned, that out of 14 verified samples 4 were 'mixta composita', 12 species were wrongly identified and 2 species were identified correctly (Braun 1982). In the same paper Braun cited some critical comments by Drensky (1939) on species described by Roşca. According to Drensky, Roşca had insufficient access to literature on spiders of Romania and neighbouring countries, especially the Balkans and therefore made some mistakes. Urak & Weiss (1997) recorded the Linyphiidae species *Silometopus reussi* (Thorell, 1871) registered as *Tapinocyba pygmaea* (Blackwall, 1834) in the 'Alexandru Roşca' spider collection. One could come to the wrong conclusion that the collection has a low scientific value with regard to the above mentioned criticism.

Nevertheless, later Petrişor (1999) verified 200 specimens which belonged to Lycosidae, Argyronetidae, Dysderidae, Agelenidae and Tetragnathidae according to the 'Alexandru

Roşca' collection. Her analysis revealed 11 cases of misidentification and some cases of wrongly used nomenclature (Petrişor 1999). For instance, *Zygiella* species were mentioned by Petrişor (1999) to be found within Tetragnathidae and *Pisaura* species within Lycosidae. We recently verified the Pisauridae and found 1 ♂, 3 ♀♀ of *Pisaura novicia* (L. Koch, 1878) not previously recorded for Romania. They were recorded as *Pisaura listeri* (Scopoli, 1763) by Roşca and as *Pisaura mirabilis* (Clerck, 1757) by Petrişor (Fedoriak & Moscaliuc 2013).

In the introduction of the Salticidae Fauna of Romania (Fuhn & Gherasim 1995) the authors mention that the spider collections of Grigore Antipa Museum were studied for Salticidae. The cited locations for species derived either from literature (including Roşca's publications) or as original and/or verified data (where the studied collections are mentioned including Roşca's collection). No critical analysis of the data from the collections was made. By re-checking the 'Alexandru Roşca' collection we found out that Fuhn added his own labels to some of the vials with the new or corrected species names. By studying his labels in comparison with the original ones we can draw the following conclusions: Dr. Fuhn relabelled some of the wrongly identified specimens and also those vials that contained more specimens and more species than stated in the original register of the 'Alexandru Roşca' collection. He managed to correct a majority of the initial labelling errors but at the same time he made erroneous identifications of species and even genera (Moscaliuc & Fedoriak 2015).

Information on the two remaining valid species described by Roşca is updated (see also results):

***Lycosa maculata* Roşca, 1939** [valid name *Pardosa roscai* (Roewer, 1951)]: the current name implies that the species was not described by Roşca, but in fact it was properly described by Roşca (1939) and only renamed by Roewer. Roşca provided a detailed description and, in our view, not very clear figures of the female and male copulatory organs. The taxonomic name was preoccupied by Hahn (1822) for *Lycosa maculata* (now *Arctosa maculata*). Because of the homonymy Roewer (1951) replaced the name with *Lycosa roscai*. Later it was reduced to the rank of subspecies as *Pardosa cribrata roscai* (Fuhn & Niculescu-Burlacu 1971) and was again elevated to a species by Bayram et al. (2009). The original material was collected by Roşca at several localities (Lipniţa, Medgidia and Gârliţa) on the territory of Romania, county of Constanta (Dobrogea region), as well as in the county of Durostor, which is now located on the territory of Bulgaria. Roşca mentioned the species as inhabiting wet meadows; mature specimens can be found in May (Roşca 1939). *P. roscai* is common in Bulgaria (Blagoev et al. 2016) and has recently been recorded abundantly in fields of genetically modified potatoes, treated with insecticide twice a season (Nedvěd et al. 2006). The species is recorded from localities along the Black Sea coast and its distribution is mostly limited to the Mediterranean basin (Elverici 2012).

***Eucta reimoseri* Roşca, 1939** [valid name *Tetragnatha reimoseri* (Roşca, 1939)] was named after the Austrian arachnologist Reimoser. Males and females were found by Roşca (1939) near the salt lakes Şabla and Duranculac, which are now in Bulgaria (previously belonging to the county of Constanta, Romania). Roşca's original description of *T. reimoseri* is very detailed, but the epigyne is depicted in a simplified manner and it is described as being similar to that of *Tetragnatha montana* Simon, 1874; the chelicerae of the male are depicted from both sides. Several well illustrated descriptions are available for *T. reimoseri*. Crome (1954) and Wiehle (1963) (both sub *Eucta kaestneri*) supplied many detailed illustrations for both sexes. Vasiliu (1968) depicted only a female and pointed to the possibility of a synonymy between *Eucta isidis*, *E. reimoseri* and *E. kaestneri*. An insufficient amount of material was available to the author to verify this hypothesis. *T. reimoseri* is a rare species due to several reasons: limited range, specific habitat requirements and small size of local populations. This led to inclusion of this species as endangered in the Red Lists of Germany, Belgium and Poland (Platen et al. 1996, Maelfait et al. 1998, Staręga et al. 2002). The known records are summarised by Hajdamowicz & Jastrzębski (2007). Later *T. reimoseri* was also recorded from Eastern Ukraine (Polchaninova 2009) and corrected to *T. isidis* by Polchaninova & Prokopenko (2013). *T. reimoseri* was similarly recorded for Belarus (Ivanov 2013a) and soon afterwards, due to misidentification, excluded from the 'The checklist of Belarusian spiders (Arachnida, Araneae)' by the same author (Ivanov 2013b). The records both from Ukraine and Belarus are listed by Mikhailov (2013), which is cited in the most commonly used sources on spider distribution in Europe (World Spider Catalog 2016, Helsdingen 2015). IJland & Helsdingen (2011) recorded the species from Italy and provided the information on *T. reimoseri* (indicating its junior synonyms) distribution. On the basis of scrupulous taxonomic remarks these authors drew the provisional conclusion that the European records of *Tetragnatha isidis* (Simon, 1880) and *T. reimoseri* (Roşca, 1939) concern one and the same species, for which the specific name *T. reimoseri* should be used (IJland & Helsdingen 2011: p. 23). Picard et al. (2014) published further analysis of the systematic position of *T. isidis* versus *T. reimoseri*.

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Nachruf/Obituary
In memoriam Prof. RNDr. Jan Buchar, DrSc. (1932–2015)

During the opening ceremony of the 29th European congress of Arachnology held in Brno last year, Professor Jan Buchar recieved an enormous, long-lasting applause for his speech. It was his farewell address.

Jan Buchar passed away on 17th November 2015. He was a kind of "celebrity" of Czech as well as world arachnology. He was an important zoologist, the leading personality who notably influenced progress of arachnology from the 1960's to the present days. Czech arachnologists called him "our Spider Father", and this nickname summarizes it all. Jan Buchar was the founding father of large Czech arachnological school. He shared more than just his knowledge with several generations of Czech arachnologists; he shared his generous personality and much of his spare time.

Jan Buchar (Fig. 1) was born on 18th February 1932 in Bystrá nad Jizerou – a small village surrounded by beautiful nature in the foothills of the Krkonoše Mts. All his family admired nature – so it was not surprising that nature became Jan Buchar's job, mission and destiny. The career of a university professor was perhaps predestined for him.

After finishing secondary school in Jilemnice, Jan Buchar began studies at the Faculty of Science of the Charles University in Prague (1951–1955) and thus started his life-long relationship with the Faculty. He was studying and teaching there, doing research and leading the Department of Zoology (1986–1990) and later the section of Invertebrates (1990–1995). In 1994, he was appointed Professor of Zoology. He was regularly commuting to the University and working there until his last days.

He always expressed the opinion that research at universities should be multidisciplinary and universal. Beside modern biochemical and molecular approaches, it is necessary to involve also comparative morphology as well as regional faunistics and ecology. In an interview he mentioned that there is no gap in understanding phylogeny, but rather in the control over deteriorating conditions of the environment crucial for the survival of the human race on the Earth.

Although the topic of Jan Buchar's M.Sc. thesis was the ciliates, he turned his attention to arachnology as early as 1958. His supervisor was Prof. František Miller (1902–1983) from the University of Agriculture in Brno. Jan Buchar gained his first arachnological experiences exploring spider communities on meadows, using formalin pitfall traps. Since the wolf spiders were the dominant family there, they became his life-long object of research and his great love. Jan Buchar published much work dealing with taxonomy, faunistics, zoogeography and ecology of these spiders. However, he did not focus only on lycosids and the territory of Europe, he also worked with material from Nepal, Bhutan, Mongolia, the Caucasus and Hindu Kush. Jan Buchar thus became an international expert in taxonomy and zoogeographic studies of Palaearctic wolf spiders. He also cooperated with numerous foreign institutions and published scientific papers in cooperation with number of significant scientists. Crucial was his meeting with Konrad Thaler (1940–2005) at the International Congress in Paris (1968). It led to a close friendship, reciprocal visits and mutual collaboration leading to 16 scientific papers and a description of five new species (Fig. 2).


Fig. 1: Prof. Jan Buchar, 2014 (photo M. Kubec)

In the field of Czech arachnology, Jan Buchar's work was a milestone in exploring the Czech as well as the Slovak spider fauna. His publications were focused not only on the complex study of Czech spiders but also on exploitation of faunistic data defining the ecological requirements of individual spider species. This data enable us to monitor environmental changes in Central Europe.

Jan Buchar discovered that spiders are an important group for bioindication of the degree of anthropological influences on the environment. His classification of spider species with respect to the degree of originality of habitats also became a model for other arthropod groups, namely insects. The classification was the basis of modern Czech arachnology. Other projects followed: grid square mapping contributed to the objective classification of species abundance and to creating distribution maps for each species. These new approaches and results from the study of Central European spiders spanning almost 50 years were summarized in the crucial work of Czech arachnology, the Catalogue of Spiders of the Czech Republic. The Catalogue presents a variety of possibilities for

the evaluation of natural conditions and is thus used by arachnologists and ecologists from the whole of Europe. This book contains description and characteristics of 830 spider species and is undoubtedly the best national catalogue of spiders in the world.

About 130 original papers are evidence of Jan Buchar's scientific erudition. He was very prolific also in the area of popularization, as documented by more than 40 popular papers, several books and instructive natural history films. He is also the author of several university textbooks.

Jan Buchar was a member of editorial boards of many scientific or environmental journals, e.g. Arachnologische Mitteilungen, Věstník Československé společnosti zoologické (later Acta Societatis Zoologicae Bohemicae), Opera Corcontica and Živa.

Jan Buchar presented results of his research at national as well as international congresses. He was an honorary member of the European Society of Arachnology, a long-time member of the International Society of Arachnology and Arachnologische Gesellschaft. As a co-author, he took part in preparing an important Checklist of the Spiders of Central Europe. In the Czech Republic, Jan Buchar collaborated with many scientific and environmental organisations. Above all he established, and for decades led, the Arachnological Section of the Czechoslovak Entomological society. He also initiated popular collecting field trips and organised more than 70 unforgettable seminars on arachnology. Everyone who visited his office was astonished by his huge library and large spider collection. His spider collection and series of historical books are now a showpiece of the National Museum in Prague. Jan Buchar was respected not only for his outstanding identification skills and broad knowledge but mainly for his humane qualities and friendly attitude.

Fig. 2: Prof. Jan Buchar with Prof. Konrad Thaler at the first Czechoslovak-Polish Arachnological Symposium in Ostrava, 1986 (personal archive of J. Buchar)

Most of us met Jan Buchar during our studies; we were his students and he was our very kind, amiable, helpful teacher and lecturer. He supervised about 50 arachnological diploma and PhD theses dealing with faunistics, ecology and nature protection, zoogeography, taxonomy, morphology, histology, cytogenetics and ethology. Thousands of students were influenced by his inspiring lectures on the Zoology of Invertebrates, Zoogeography, Arachnology and many others. They took place both in large auditoriums as well as in his office for just a few students. The most exciting experience was to accompany Jan Buchar in the field – he knew Czech nature and the landscape perfectly (Fig. 3). But he also organized several student expeditions to the Caucasus and Central Asia. We still remember these common journeys. We were climbing on the rock steppe, observing spiders... This was the real arachnological school!

Jan Buchar had been guiding us for many years, he inspired and encouraged us. We were given a chance to be involved in his unique school. He brought us to our life-long interest and employment: learning about the life of arachnids on our planet. We'll always miss you, Professor Buchar.

Spiders described by Jan Buchar:

Abbreviations:

*	= valid species, deposition of the type material is given in parenthesis
BZL	= Biologiezentrum, Linz, Austria
IZLI	= Institute of Zoology & Limnology, Innsbruck, Austria
IZS	= Institute of Zoology, Sofija, Bulgaria
MHNG	= Museum d'Histoire Naturelle, Genève, Switzerland
NMB	= Naturhistorisches Museum, Basel, Switzerland
NMBE	= Naturhistorisches Museum, Bern, Switzerland
NMP	= National Museum, Prague, Czech Republic [inventory number in brackets]
NMW	= Naturhistorisches Museum, Wien, Austria
SMF	= Senckenbergischen Museum, Frankfurt am Main, Germany
SNMB	= Slovak National Museum, Bratislava, Slovakia
ZISP	= Zoological Institute, Sankt Peterburg, Russia
ZMMU	= Zoological Museum of the Moscow State University, Moskva, Russia

Agyneta milleri (Thaler, Buchar & Kůrka, 1997)* (MHNG, NMP [P6E 2943], NMW, SNMB)

Alopecosa kalavrita Buchar, 2001* (NMBE, NMP [P6A 6061], NMW)

Alopecosa psammophila Buchar, 2001* (NMP [P6E 2863])

Arctosa janetscheki Buchar, 1976* (IZLI)

Arctosa kozarovi Buchar, 1968 (syn. of *Arctosa tbilisiensis* Mcheidze, 1946; IZS)

Arctosa renidescens Buchar & Thaler, 1995* (MHNG, NMB, NMP [P6A 4934], NMW)

Fig. 3: Prof. Jan Buchar with students on the last field excursion, May 31, 2015 (photo P. Dolejš)

Aulonia kratochvili Dunin, Buchar & Absolon, 1986* (NMP [P6A 4933], ZISP)
Dorjulopirata dorjulanus Buchar, 1997* (NMB)
Drassodes tiritschensis Miller & Buchar, 1972* (NMP [P6E 2937])
Evippa nigerrima (Miller & Buchar, 1972)* (NMP [P6E 2919–2923])
Gnaphosa danieli Miller & Buchar, 1972* (NMP [P6E 2880–2881])
Haplodrasus bohemicus Miller & Buchar, 1977* (NMP [P6A 5851, P6E 2973])
Hippasa bifasciata Buchar, 1997* (NMB)
Mughiphantes hindukuschensis (Miller & Buchar, 1972)* (NMP [P6E 2892])
Pardosa aquila Buchar & Thaler, 1998* (BZL, MHNG, NMW, ZMMU)
Pardosa bulgarica Buchar, 1968 (syn. of *Pardosa roscai* (Roewer, 1951); NMP [P6A 4937])
Pardosa dagestana Buchar & Thaler, 1998* (NMW)
Pardosa drenskii Buchar, 1968* (NMP [P6A 4936])
Pardosa ibex Buchar & Thaler, 1998* (NMW, ZMMU)
Pardosa martensi Buchar, 1978* (SMF)
Pardosa orealis Buchar, 1984* (SMF)
Pardosa pseudotorrentum Miller & Buchar, 1972* (NMP [P6E 2929–2932])
Pardosa tasevi Buchar, 1968* (IZS)
Pardosa thaleri Buchar, 1976 (syn. of *Pardosa bifasciata* (C. L. Koch, 1834); IZLI)
Pardosa tikaderi Buchar, 1984 (syn. of *Pardosa mongolica* Kulczyński, 1901; SMF)
Piratula hurkai (Buchar, 1966)* (NMP [P6A 4935])
Trochosa dentichelis Buchar, 1997* (NMB)
Trochosa gravelyi Buchar, 1976* (IZLI)
Zelotes kodaensis Miller & Buchar, 1977 (syn. of *Zelotes puritanus* Chamberlin, 1922; NMP [P6A 5352, P6E 2897–2898])
Zoica oculata Buchar, 1997* (NMB)

Species named in honour of Jan Buchar:
Bathyphantes eumenis buchari Růžička, 1988
Harpactea buchari Dunin, 1991
Kirschenblatia buchari Boháč, 1977 (syn. of *Philonthus spinipes* Sharp, 1874) [Coleoptera, Staphylinidae]
Lychas buchari Kovařík, 1997 [Scorpiones, Buthidae]
Pardosa buchari Ovtcharenko, 1979
Philodromus buchari Kubcová, 2004
Sintula buchari Miller, 1968 (syn. of *Sintula spiniger* (Balogh, 1935))

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Gratulation/Congratulation

Klaus Lippold – ein fleißiger Sammler wurde 85

Sicherlich kennt und vor allem teilt Klaus meine schlichte Art des Umgangs mit Ehrentagen. Und nun ein solch umfänglicher Artikel in einer arachnologischen Zeitschrift über ihn statt über Pseudoskorpione! Bei der Überschrift hätte ich wohl guten Gewissens schreiben können „ – der fleißigste Sammler …" Wie auch immer, wäre Gelegenheit gewesen, hätte er nach Kräften versucht, mir so etwas als unnötig und überflüssig auszureden. Ich kann deshalb nur wünschen, seine Vita ins rechte Licht gerückt zu haben und hoffen, dass er mir in seiner Bescheidenheit nicht allzu böse ist.

Ich freue mich vor allem, dass es nicht nur mir gelungen ist, den Autoren-Namen Lippold in diversen Publikationen wenigstens als Coautor der Fachwelt zu vermitteln. Hinsichtlich der anderen besammelten Tiergruppen ist das offenbar nicht der Fall. Und dass er 1994 in der AraMit-Redaktion mal anstelle meines treffenden „Lippold & Drogla" ein „Drogla & Lippold" ausgekungelt hatte, sei nur am Rande vermerkt. Ich stutzte erst, als ich die Sonderdrucke sah und blätterte erschrocken in meinen Manuskripten. Ihn, der sich vor dem Schreiben eher scheute, verstehe ich allerdings nur zu gut. Es ist wohl keine Feigheit, wenn man eher nichts in einem Fachblatt publiziert, weil man nicht vom Fach ist. So wird es wieder mal die Ehrung für einen Forscher, dessen Verdienste man keinesfalls von der Länge seiner Publikationsliste ableiten kann. Es geht also um jemanden, der überdurchschnittlich viel gesammelt hat. Und was nicht weniger bedeutsam ist, seine Sammlung hat trotzdem zum großen Teil bereits Eingang in die Fachliteratur gefunden (insbesondere Drogla & Lippold 2004). Und das Tiermaterial nebst Unterlagen befindet sich in guten Händen, im Senckenberg Museum für Naturkunde Görlitz. Ich vermute, die schiere Zahl an Belegen gibt noch Brot für Generationen von Bearbeitern. Nicht zuletzt für diese mögen meine Zeilen zu seinem 85. Geburtstag Randinformationen liefern, um die Fundumstände einordnen zu können. Aber der Reihe nach.

Klaus (Abb. 1) wurde am 29.9.1930 in dem kleinen Dorf Untergrochlitz, Ortsteil der nahen Stadt Greiz, geboren. Die meisten seiner Vorfahren waren Weber, üblich in der Greizer Region. Außer ihm gab es acht Jahre später in der Familie noch Bruder Karl, welcher Arzt wurde.

Der aktive Kriegsdienst blieb Klaus altershalber erspart. Vor der nicht weniger unseligen Volkssturmteilnahme bewahrte ihn wohl nur das große diplomatische Geschick seines Vaters. Klaus besuchte die Oberschule, bewarb sich bereits mit dem Zeugnis der 11. Klasse an der Musikhochschule in Weimar. Mit der Praxis längeren Geigenunterrichts bestand er dort die Aufnahmeprüfung. So konnte er auch ohne Abitur 1950 sein Studium beginnen und 1955 mit dem Examen beenden. Nach Stationen bei Orchestern in Mühlhausen und Halle bekam er eine Stelle als Solobratscher im Orchester eines Stendaler Theaters angeboten. Schließlich zog es das Ehepaar Lippold 1965 aus dem allzu beschaulichen Stendal nach Leipzig, wo eine recht angenehme Zeit begann. Klaus wirkte an der musikalischen Komödie, im sogenannten kleinen Haus. Seine Instrumente waren Geige und Bratsche.

Abb. 1: Klaus Lippold 2010

In Leipzig standen auch die Sterne für ein Sammlerleben günstig, Neubauwohnung, gute Verkehrsanbindung innerhalb und außerhalb der Stadt… Da sein Dienst die Tageszeit oft aussparte, ließ sich manche Sammeltour einrichten. Und nicht zu vergessen, seine herzensgute Ehefrau Annemarie, Apothekerin, war wohl die Idealpartnerin für ihn. Jedenfalls gehört schon ein tüchtiges Maß an Toleranz dazu, ein derart zeitintensives Hobby nicht nur zu tolerieren, sondern noch zu unterstützen. Zuweilen schrieb sie mir sogar Briefe oder Mitteilungen, wenn ihr Gatte keine Zeit fand.

Mich persönlich verbindet mit Klaus bereits eine längere „Arachnologen-Freundschaft". Unser erster Kontakt war ein Brief von ihm im April 1980, damals noch aus der Leipziger Rossbachstraße. Dr. Dunger vom Naturkundemuseum Görlitz hatte ihm meine Adresse vermittelt. Mit Dr. Seifert war er schon einige Jahre bekannt. Klaus hätte sich bereits etwas in die Pseudoskorpions-Thematik eingearbeitet und bat um weitere Unterstützung. Aus meiner Antwort ging hervor, dass wir nun schon zwei waren, die sich in der DDR mit dieser Tiergruppe näher befassten. Von ihm übernahm ich auch bald die Siebmethode zum Fangen.

Hinter seiner Formulierung „einzuarbeiten versucht" vermutete ich ohnehin eine starke Untertreibung, er hatte jeden-

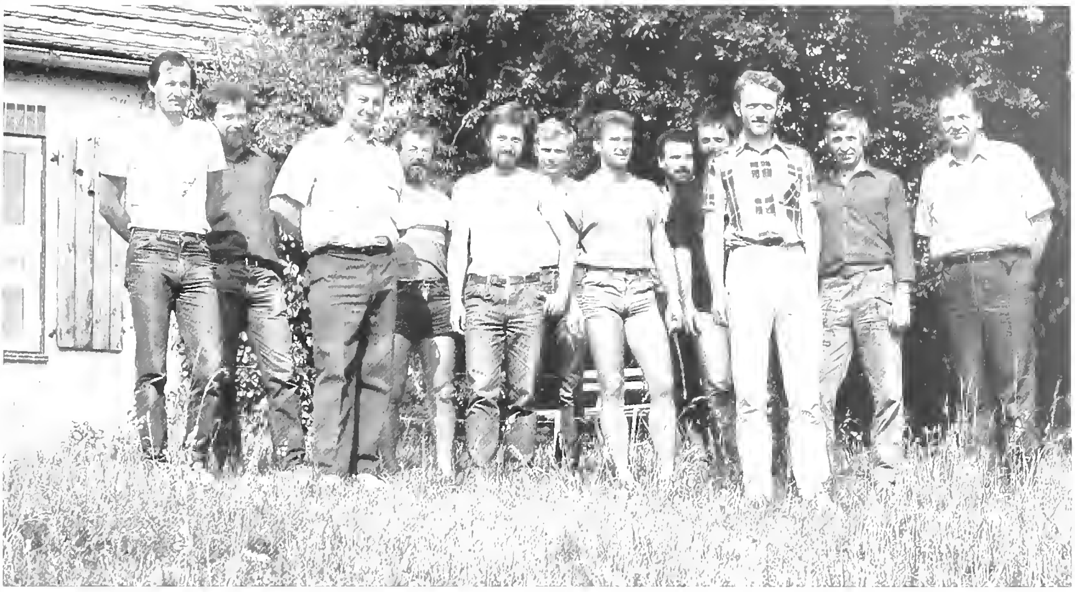

Abb. 2: Arachnologentreffen Müritzhof 1989, von links nach rechts: Roland Pfüller, Andreas Arnold, Dieter Martin, Peter Sacher, Volkmar Kuschka, Ralf Weber, Steffen Malt, Detlef Tolke, Peter Bliss, Reinhard Weidlich, Reiner Drogla, Klaus Lippold

falls schon an die 20 Arten gefunden! Das ist immerhin etwa die Hälfte der Arten des damaligen DDR-Gebiets. Die spätere Auswertung seiner Artkartei (s. Drogla & Lippold 2004) übertraf meine Ahnung. Einige willkürliche Auszüge seien genannt. Den ersten Eintrag fand ich unter dem 1.8.1976 für Pamporovo/Bulgarien (*Roncus lubricus*). Die intensive Sammeltätigkeit begann im Frühjahr 1977. Für die „Sammelart" *Neobisium carcinoides* finden sich in diesem Jahr 9 Funddaten von 8 Sammelorten. Die Kartei beinhaltet die chronologisch geführten Fangtagebücher bis 1989.

Wenn ich seine jährlichen Fangtagebücher durchsehe, so bin ich wohl nicht der einzige, bei dem sich angesichts dieser Zahlen schlichtweg Minderwertigkeitskomplexe einstellen. Die Ergebnisse zweier willkürlich ausgewählter Jahre möge man einmal im Zusammenhang mit den zugrundeliegenden Individuenzahlen bisheriger Publikationen sehen (s. u.): 1980 erbrachten 30 Fundorte an 51 Fangtagen reichlich 1200 Individuen. Für 1988 sind von 54 Fundorten an 60 Terminen 2740 Tiere in 21 Arten erfasst. Allein von *Neobisium carcinoides* finden sich an 27 Fundorten zu 35 Terminen 1770 Tiere, gefolgt von 299 *Allochernes wideri*, der zweithäufigsten Art. Sein Blick dafür, wo die Suche lohnt, scheint gerade für *N. carcinoides* nicht allzu viele Fehlversuche ergeben zu haben. Nur selten findet man die Bemerkung „nichts gefunden" oder, dass er von der geringen Ausbeute enttäuscht war. Dabei weiß jeder Faunist, wie viele Fangversuche ergebnislos ausgehen, insbesondere Pseudoskorpione sind im Allgemeinen doch eher Beifänge. Im Übrigen gibt es auch an seiner Buchführung nichts auszusetzen!

Klaus sammelte vorwiegend mit dem üblichen Insektensieb (Gesiebesack). Innerhalb der Fundorte wurden natürlich alle sich anbietenden Habitate/Straten berücksichtigt, Bodenlaub, Baummulm, lose Rinde u. ä., okulare Absuche unter Steinen und Holz kam hinzu. Prinzipiell tat er alles Abgesiebte auf ein Tuch und fing die Weglaufenden von Hand. Nun ist Klaus Lippold ein recht stattlicher Mann von reichlichen 1,80 m und entsprechend großen Händen. Eigentlich traut man ihm weder den Umgang mit der Geige, erst recht nicht mit millimetergroßen Pseudoskorpionen zu. Nicht nur ich habe mich gewundert, dass es regelrecht sein Markenzeichen war, beim Auslesen der Gesiebeproben die Tierchen ohne Pinzette oder Pinsel ins Sammelröhrchen zu befördern. Dazu befeuchtete er kurz einen Finger mit der Zunge und tupfte selbst die nur 1-2 mm großen, sehr zarten Chthoniiden vom Tuch. Zweifellos war es lebenslanges Üben an Geige und Bratsche, was seine Fingerfertigkeit schulte.

Innovativ, jedoch für mich ungeeignet, fand ich auch, wie er etwa die selten einen mm Länge erreichenden Palpenscheren seiner geliebten (mir eher suspekten) *Chthonius* betrachtete. Er legte sie in Flüssigkeit auf einen Objektträger und verschob darüber mit bewundernswertem Geschick ein Deckglas. Damit öffnete er sie zerstörungsfrei und fixierte sie auch noch für hohe Vergrößerung, um die bestimmungswichtige Bezahnung nebst Basallamelle zu begutachten.

Seine Funde stammen vorwiegend aus dem Gebiet der DDR. Jedenfalls fallen die anderen Herkünfte gemessen an der Gesamtausbeute kaum ins Gewicht. Da er Pseudoskorpione intensiv „nur" bis zum Sommer 1990 sammelte, ist für sie auch der Begriff „Neue Bundesländer" nicht ganz gerechtfertigt. Sein Fortbewegungsmittel ist prinzipiell die Eisenbahn gewesen. Die weitaus meisten Funde stammen aus Gegenden, die per Bahn erreichbar waren. In und um Leipzig nutzte er natürlich Straßenbahn und Bus. Übrigens ein Geheimtip zur Erzielung guter Fangergebnisse, den er einmal Dr. Muster offenbarte. Langes Warten auf Rückfahrmöglichkeiten zwang ihn oft, weiter zu sammeln, wenn er eigentlich schon meinte, es gäbe nichts mehr zu holen. Dann hätte er oft die interessantesten Sachen gefunden!

In den 1980er Jahren sahen wir uns fast regelmäßig zu Dr. Martins jährlichen traditionellen Treffen der DDR-Arachnologen. Sie fanden im „Müritzhof" inmitten des NSG „Ostufer der Müritz" bei Waren statt (Abb. 2). Unscheinbar für Außenstehende ist in diesem Zusammenhang seine lakonische Aufzählung in Lippold (1985). Für den Spezialisten spricht es Bände, dass man vom 25.6.-1.7.1984 (nebenbei während einer Tagung!) „in der Umgebung der Zentralen Lehrstätte für Naturschutz" zehn Arten Pseudoskorpione, damals ein geschätztes Drittel der DDR-Fauna, sammeln kann. Dass es sich um 103 Individuen handelte, hielt er nicht für erwähnenswert. Möglicherweise hatte ich Anteil daran. Ich fehlte wegen unlängst geborener Tochter, und er fand keinen genügend einschlägigen Gesprächspartner. *Cheiridium museorum*

Abb. 3: 2006 beim Auslesen eines Gesiebes bei Tröbigau

und *Chelifer cancroides* (nicht *M. ressli*) stammten übrigens aus einem Schwalbennest im Gebäude.

Seine ertragreiche Sammeltätigkeit beschränkte sich allerdings keinesfalls auf Pseudoskorpione. Heuschrecken sammelte Klaus bereits, als wir uns kennenlernten. Es existiert ein A5-Heft, in das er wohl alle Artnamen der Heuschrecken aus „Die Orthopteren Europas" von K. Harz übertragen hatte. Darauf kam er nach der „Pseudo-Phase" wieder zurück. So schrieb er mir Ende 1999: „Um diese Zeit [August] selbst unterwegs, begann ich dann eine überaus fleißige und durchaus auch erfolgreiche Sammeltätigkeit nach einheimischen Heuschrecken. ... Dafür blieb keine Zeit für die Pseudos." Und ein Jahr später: „war auch draußen und viel unterwegs, suchte gerne nach Heuschrecken, blieb aber von Seltenheiten verschont." Doch auch mit Ameisen kannte er sich blendend aus, fand manche Rarität. Schließlich eine Mitteilung vom Herbst 1995: „Mit Weberknechten freundete ich mich an ..."

Ehrfurchtsvoll muss ich dabei anerkennen, dass er nicht nur sammelte, sondern prinzipiell seine Fänge auch recht zügig determinierte. Unter Faunisten ist das durchaus keine durchgängige Praxis, ... wenn ich meine Sammlungen so anschaue. Und werte ich seine Notizen aus, so spüre ich als Biologe kaum, dass hier ein Musiker gesammelt hat. Geradezu ein Glücksfall ist es, dass sein gesamtes Material einschließlich dessen Dokumentationen geordnet und determiniert an ein renommiertes Museum kam. Inbegriffen ist seine Fachbibliothek. Vielleicht trug mein Zureden auch ein klein wenig dazu bei. Dres. A. Christian und B. Seifert vom Senckenberg Museum für Naturkunde Görlitz gewährten mir großzügig Einblick in die einschlägigen Unterlagen aus dem Jahre 2003:

Im Rahmen eines Werkvertrags vom 3.11.2003 „... Übergabe ... mit folgendem Umfang:

Pseudoscorpiones:	ca. 34 Arten in insgesamt ca. 21000 Exemplaren
Opiliones:	ca. 29 Arten in insgesamt ca. 300 Exemplaren
Chilopoda:	ca. 27 Arten in insgesamt ca. 300 Exemplaren ..."

Dr. Seifert schreibt unter anderem an Klaus: „Du darfst versichert sein, dass die Ergebnisse Deiner spannenden Arbeit als Freizeitforscher einen namhaften Beitrag zur Aufwertung unserer Sammlung bedeuten und dass eine gute Pflege des Materiales gesichert ist. ..."

Eine Zählung der Insekten ergab insgesamt 12590 Individuen, unter anderem:

Formicidae:	8832
Hymenoptera, exkl. Formicidae:	1557
Saltatoria:	1543
Diptera:	333

Im Übernahmeschriftstück noch der Vermerk: „Das gesamte Material wurde von Klaus Lippold selbst gesammelt, präpariert und determiniert. ... "

Doch zurück zu den Pseudoskorpionen: Eigentlich müsste ich mit reichlich 2000 bearbeiteten Individuen im Drogla & Lippold (2004) kein schlechtes Gewissen haben. Aber neben den fast 21000 Tieren in 33 Arten, die Klaus hierzu beisteuerte, spielen sie doch eher eine Nebenrolle. Und ohne sie wären niemals auch nur annähernd derart weitreichende Aussagen möglich gewesen.

Nach seinen Unterlagen kommt Klaus bis zum Jahre 2002 auf insgesamt ca. 21250 Pseudoskorpione. Ich kenne, zumindest im mitteleuropäischen Raum, keinen Bearbeiter, nicht einmal Forschungsgruppen, die vergleichbare Mengen an Material selbst zusammengetragen haben. Gleichzeitig unterstreicht das einmal mehr die Bedeutung ehrenamtlicher Hobbyforschung als Ergänzung zur etablierten Berufs-Wissenschaft, auch finanziell betrachtet. Für ihn war es vordergründig Freude an der Sache, er musste niemanden um Geld oder andere Ressourcen ersuchen. So konnte es ihn nicht berühren, dass seine Sammelobjekte nicht im Fokus der biologischen Wissenschaft stehen, dass Faunistik und Taxonomie im Zeitalter der Genetik/Gentechnik eher verächtlich betrachtet werden.

Es liegt in der Natur der Sache, dass sich wesentlicher Erkenntnisgewinn heute vorwiegend nur noch bei größeren Untersuchungen durch Fachwissenschaftler erzielen lässt. In

der Regel handelt es sich um komplex angelegte Projekte mit Teams von Bearbeitern. Sie sind weitgehend von staatlicher Seite initiiert, finanziell gefördert und von Fachinstitutionen koordiniert bzw. begleitet. Muster & Blick (2015) bieten guten Einblick in diese Thematik. Aufschlussreich ist auch die dortige Betrachtung zu Artenzahlen (S. 46f) im Vergleich mit Klaus' Erfassung um den „Müritzhof" 1984. Man verzeihe mir mein Faible für Zahlenspiele im Rahmen einer Geburtstagslaudatio. Doch eindrucksvoller als anhand der drei „ertragreichsten" Veröffentlichungen für Deutschland kann man Klaus' Lebenswerk wohl kaum einordnen:

Muster & Blick (2015) – 4567 Individuen in 13 Arten
Braun & Beck (1986) – 3777 Individuen in 2(!) Arten
von Helversen (1966) – 554 Individuen in 21 Arten

Die genannten drei insgesamt behandeln 8898 Individuen, Klaus Lippold sammelte allein das 2,4-fache. Zum bestimmenden Einfluss der Fangmethodik sei nur auf Braun & Beck (1986) verwiesen, dass „Pseudoskorpione mit der Handauslese ... verhältnismäßig effektiv erfasst werden", neben der Nutzung öffentlicher Verkehrsmittel ein weiteres „Geheimnis" für Klaus' Fangzahlen? Seine Pseudoskorpion-Fundortdatei (>1400 Datensätze) wurde inzwischen von C. Muster georeferenziert und in eine Datenbank eingegeben. Die Daten dieser Fleißarbeit sollen ab April 2016 in die Nachweiskarten der Spinnentiere Deutschlands (Online-Atlas) einbezogen werden.

Trotz seiner „Medienscheue", wie man das heut gerne nennt, war ihm nicht bange, gelegentlich mit Leuten vom Fache zu diskutieren, die aber immer recht dünn gesät waren. Für Pseudoskorpione sind wir beiden lange Zeit die Einzigen in unserm Aktionsraum DDR gewesen. Im Grundsatz war er ansonsten jedoch erfolgreicher Autodidakt. So konnte er sich letztlich durchaus auf Augenhöhe mit Kapazitäten wie Prof. Mahnert unterhalten, den er im Herbst 1991 in Genf besuchte.

Annemaries Krankheit und ihr viel zu früher Tod 1990 bedeuteten eine tiefe Zäsur in Klaus' Leben, nicht nur in seiner Sammeltätigkeit. In den darauffolgenden Jahren fand er trotzdem hin und wieder dazu zurück, wie die obigen Zitate zu andere Tiergruppen beweisen. Auch mein Wald und Hausgrundstück profitierten davon. Fernsehen bezeichnete er übrigens als „Kapitulation des Geistes", dafür las und malte er lieber. 1995 ging er planmäßig in Rente und beendete 2003 seine Zeit als Jäger und Sammler (Abb. 3). Mittlerweile lebt er in einer Einrichtung für betreutes Wohnen in Leipzig-Probsthaida. Nachträglich alles Gute zum 85!

Eigentlich wollte ich längst seine „Pseudoskorpione aus der Umgebung von Leipzig" etwas überarbeitet, kommentiert und zur Veröffentlichung eingereicht haben, natürlich unter Klaus Lippold. Ein älteres Manuskript von ihm, er hatte es verlegt. So muss es noch etwas warten. Seine Erfahrungen, Fingerspitzen- und Bauchgefühl eines Sammlers, sein Vorbild im Sammeleifer sollten aber keinesfalls verloren gehen.

Publikationen von Klaus Lippold (chronologisch)

Lippold K 1985 Pseudoskorpione aus dem NSG "Ostufer der Müritz". – Zoologischer Rundbrief des Bezirkes Neubrandenburg 4: 40

Bliss P & Lippold K 1987 Pseudoskorpione (Arachnida, Pseudoscorpiones) aus dem Hakelwald im Nordharzvorland. – Hercynia N.F. 24: 42-47

Drogla R & Lippold K 1994 Neunachweise von Pseudoskorpionen in den neuen Bundesländern (Arachnida, Pseudoscorpionida). – Arachnologische Mitteilungen 8: 75-76 – doi: 10.5431/aramit0815

Muster C & Lippold K 2003 *Chthonius (Chthonius) alpicola* neu für Deutschland (Arachnida: Pseudoscorpiones). – Arachnologische Mitteilungen 26: 55-58 – doi: 10.5431/aramit2605

Drogla R & Lippold K 2004 Zur Kenntnis der Pseudoskorpion-Fauna von Ostdeutschland (Arachnida, Pseudoscorpiones). – Arachnologische Mitteilungen 27/28: 1-54 – doi: 10.5431/aramit2701

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Braun M & Beck L 1986 Zur Biologie eines Buchenwaldbodens. 9. Die Pseudoskorpione. – Carolinea 44: 139-148

Helversen O von 1966 Pseudoskorpione aus dem Rhein-Main-Gebiet – Senckenbergiana biologica 47: 131-150

Muster C & Blick T 2015 Pseudoscorpions (Arachnida: Pseudoscorpiones) in Strict Forest Reserves in Hesse (Germany). – Arachnologische Mitteilungen 50: 37-50 – doi: 10.5431/aramit5006

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Buchbesprechung/Book review

Schikora H-B 2015 Die Webspinnen des Nationalparks Harz. – Schriftenreihe aus dem Nationalpark Harz 13: 1-371

Din A4, fester Einband. Preis: 15 € & Versandkosten. Bestellung: Nationalparkverwaltung Harz, Lindenallee 35, 38855 Wernigerode; E-Mail: info@nationalpark-harz.de

Erstmals wird von Hans-Bert Schikora für einen deutschen Nationalpark eine Monografie der Spinnenfauna vorgelegt. Er hat sie Peter Sacher gewidmet, der von 1991 bis 2009 im Nationalpark tätig war und dort Erfassungsprogramme, u. a. für die Spinnen, initiierte und dabei auch tatkräftig selbst mitwirkte. Mit 371 Seiten und festem Einband ist es kein Buch zum unterwegs Lesen oder für das Freiland sondern zum Blättern und Lesen zu Hause oder im Büro.

Der Inhalt beginnt mit ausführlichen einleitenden Kapiteln: mit ausführlichen Erläuterungen zur Geschichte der arachnologischen Forschung im Harz (p. 5-10), über den Naturraum Harz (p. 11-13), gefolgt von einer Einführung in die Biologie der Spinnen (p. 14-20) und einer Übersicht der nachgewiesenen Spinnenfamilien (p. 21-32). Die Untersuchungsgebiete (Waldstandorte, Waldforschungs- und Naturwaldforschungsflächen, Zwergstrauchheide der Brockenkuppe, Moore, Blockhalden, Fließgewässerufer und anthropogene Sonderstandorte) werden ebenfalls ausführlich und bebildert vor- und dargestellt (p. 33-55), ebenso die verwendeten Erfassungsmethoden für die Spinnen (p. 56-60). Die „bedeutsame Biotope für die Webspinnen" sind anhand der nachgewiesenen Rote-Liste-Arten (Deutschland 1996/1998, Sachsen-Anhalt im Druck und Niedersachsen 2004) und ihrer Vorzugslebensräume zusammengestellt (p. 61-64). Obwohl der Nationalpark Harz zu den arachnologisch am besten untersuchten Großschutzgebieten zählt, gibt es weiteren arachnofaunistischen Untersuchungsbedarf (p. 65-66). Der reich bebilderte Hauptteil des Bandes ist das „Kommentierte Verzeichnis der Webspinnen" (p. 67-342). Die Texte zu jeder Art enthalten eine Beschreibung, Angaben zur Gefährdung und des Gesamtareals, zu Vorkommen und Lebensweise und den Nachweisen im Nationalpark. Phänogramme, die Datenbasis, Quellenangaben und eines oder mehrere Fotos für die meisten Arten (lebende Tiere und/oder Nasspräparate). Auf die Beschreibung genitalmorphologischer Differentialmerkmale wurde bewusst verzichtet – Genitalien sind dementsprechend nur für sieben Arten dargestellt (http://www.wsc.nmbe.ch/refincluded/13217). Die Arttexte enthalten einen umfangreichen Fundus an Informationen und werden sicherlich künftig viel genutzt. Insbesondere bei den Linyphiiden hat man einerseits den Eindruck „optischer Redundanz" durch die phänotypische Ähnlichkeit vieler Arten, andererseits kann die Darstellung der Habitus-Abbildungen eines solch eines großen Artenpools aber auch hilfreich zur Erkennung diffiziler Unterschiede in Färbung und Zeichnung sein. Neben „üblichen" Inhalten (Abkürzungen, Glossar, Dank, Register) sind noch das Verzeichnis der

Weberknechte und Pseudoskorpione (p. 343-344: 19 Arten Weberknechte und 2 Arten Pseudoskorpione) sowie das Verzeichnis der im Nationalpark nachgewiesenen Spinnenarten (p. 359-363: 420 Spinnenarten, die höchste Artenzahl für einen deutschen Nationalpark!) zu nennen. Für einige Arten wird durch den Nachweis im Harz das bekannte Areal erweitert (z. B. *Centromerus subalpinus*, *Neon robustus*) oder Verbreitungslücken geschlossen. Was ich vermisse, wenn man das bei einem solch umfangreichen Band so nennen darf, sind Zusammenstellungen der Spinnenzönosen (z. B. dominanter und typischer Arten) der untersuchten Lebensraumtypen.

Fazit: Ein Meilenstein deutschsprachiger spinnenmonografischer Arbeiten, den sich jeder leisten kann und sollte.

Theo BLICK

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